MAY, 1944

# Industrial FINISHING

Published Monthly in the Interest of Modern Production Finishing

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## Which LINE are you on?

Firing Line

Production Line

Paying Line

MANY of the boys on the firing line will get hurt and many of them will be killed. Are you on the production line working until it hurts? . . . and are you on the paying line buying bonds until it hurts? Come on America—let's all pull together and get this thing over as soon as possible.

LILLY VARNISH COMPANY

THE LILLY COMPANY, High Point, North Carolina

# RCA's biggest show... 10,000 announcers!

## and PALADIN

## helps keep 'em "on the air"

A THOUSAND PLANE RAID over Berlin—10 men to a plane—every man with his own phone. 10,000 voices that *must* be heard at all times. Nothing must go wrong with those communication sets—not even the *surface coatings* on panels and delicate instruments!

If a tiny particle of the enamel should chip and fall into the equipment—it might keep the communication set from functioning properly. That's why Radio Corporation of America . . . makers of communication sets for everything that rides, flies, walks or swims in this war . . . chose Roxalin's plastic base Paladin.

Paladin is specially engineered for use on cadmium and other base metals on which it is extremely difficult to get adhesion. Roxalin's Paladin sticks stubbornly—will not chip in the toughest usage. And it affords maximum resistance to corrosion—a vital qualification in the dank, moisture-saturated, jungle fighting of the Pacific.

What is your toughest surfacing problem? Our files of specially engineered finishes for all branches of industry—plus the skill and experience of our technical staff—are at your disposal. Write us for complete information.

ROXALIN *flexible* FINISHES
INCORPORATED
ELIZABETH • NEW JERSEY

WATCH ROXALIN IN AVIATION

# Enamel Strippers*

**NOTICE HOW ENTHONE ENAMEL STRIPPER WRINKLES AND COMPLETELY REMOVES ENAMEL FROM BASE METALS.**

**SURFACE IS CLEANED AND READY FOR PAINT.**

## THE ENTHONE CO.

**NEW HAVEN, CONN.**

*Patented by U. S. Patent No. 2242106

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LACQUERS
ENAMELS
SEALERS
PRIMERS

NEW PERIOD
WOOD and METAL
FINISHES

SYNTHETICS
VARNISHES
SHELLAC
FILLERS
STAINS
SUPPLIES

# No. 100 NEW-LAC

## A New Clear Primer-Sealer

- Thins only with denatured alcohol in any proportion.
- Dries quickly to a brilliant, clear, pale, tough film on wood and metal.
- Has outstanding adhesion to metal . . Forms an excellent bond between any "Hard to Paint" surfaces and finish coats.
- No. 100 NEW-LAC is an exceptional shellac replacement.
- Sands easily to a smooth film.
- Seals all porous surfaces.

*Quotations and technical information gladly sent at your request . . or order 5 gallon working sample at barrel price.*

NEW PERIOD PRODUCTION FINISHES

NEW YORK WOODFINISHERS SUPPLY CO., INC.
109 INLAY STREET BROOKLYN, N. Y.
Established 1917

TWENTIETH YEAR OF PUBLICATION

W. H. ROHR, Editor E. A. DOSCH, Assoc. Editor

Vol. XX, No. 7 MAY, 1944 $2.00 a Year

# Contents of This Issue

Letters from Readers ..... 5
Production Painting of Cargo Trailers ..... 18
The Theory and Use of Zinc Chromate Primers ..... 24
Problem of Shrinkage on Wood Furniture ..... 40
What the War Has Taught Us About Finish Cost ..... 50
How to Get More Out of Your Equipment ..... 54
Recovery of Waste Finish Materials ..... 64
Finishing Fiberboard Panels ..... 68
Meeting Wartime Restrictions in Finishing Willow and Oak Caskets ..... 74
Materials; Supplies; Equipment ..... 78
Questions and Answers ..... 90
Booklets; Catalogs; Circulars ..... 94
Editorial ..... 98
Random Comments on the Industrial Scene ..... 102
"Classified Advertising" Section ..... 110
Index to Advertisers ..... 111

Calcium Chloride Folders ..... 22
Black Finish on Copper ..... 38
G. A. Lux Joins Oakite's Technical Staff ..... 38
American-Marietta Co. Buys Sewall Paint Co. ..... 46
Conway Joins Udylite Corp. ..... 52
Cleaning Metal for Product Painting 60
Painting Welded Joints ..... 62
Standard Varnish Appoints C. R. W. Thomas ..... 62
Sealing Metal Joints ..... 72
Geo. Litchfield Advanced in Jones-Dabney Co. ..... 72
Becomes Purchases Director for Sherwin-Williams ..... 72
Ace Laboratories Moves ..... 72
Sterling Announces Important Sales Plans ..... 72
Flame-Proof Paint ..... 76
Ventilation Literature ..... 76
Cleaning Metal ..... 94
Infra-Red Heat Units ..... 110
Offers Postwar Planning Helps ..... 110

Owned and Published by

**Practical Publications, Inc., 1142 N. Meridian Street, Indianapolis 4, Ind.**

Eastern Representative: C. A. Larson, 254 West 31st St., New York 1, N. Y.; Phone Penna. 6-9049

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ON THESE NEW PRESERVATIVE STAINS

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*Manufacturers of* "UNQUESTIONABLE QUALITY" *Industrial Finishes*

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**COTTON or RAYON FLOCKS**

on that lovely novelty you're making. The cost is low —and makes your sales and profits grow. Beautiful summer pastel shades lend a charm and eye appeal not duplicated by any other surface treatment.

*For cotton, wool or rayon flocks of quality unsurpassed, write for color card and samples.*

**Claremont Waste Mfg. Co., Claremont, N. H.**

*The Country's Largest Manufacturers of Flocks*

# CLAREMONT FLOCKS

*Cotton... Wool... Rayon*

# Letters from Readers

## Paint Removal Equipment

Mr. G. C. Close: In your article in February 1944 issue, "Different Processes for Cleaning Metal," you refer, on page 46, to portable apparatus for steam-caustic removal of paint. Would you mind listing manufacturers of equipment which you have in mind?

Occasionally our customers inquire regarding methods available for removing paint from installed transformers, and such equipment should be considered.

Would you also know, off-hand, if such equipment would be adaptable to subsequent spraying of a dilute chromic acid (neutralizing) solution?—G. E. Co.

## Oil for Stored Aluminum

We note in the April issue of INDUSTRIAL FINISHING (page 5) where someone has written asking for information on "Penseal." We do not know "Penseal" and are not familiar with the company, but we do have several products that are performing satisfactorily for the storage or shipment of aluminum and its alloys. If this company would like to get in touch with us we would be pleased to forward them our literature, etc., on these coatings.—APEX ALKALI PRODUCTS CO.

## To Remove Blackout Paint

I just received my copy of I. F. for April and therein noted a published letter entitled, "How Can We Remove Blackout Paint?" (page 84).

Having just completed the development of a new type of paint and varnish remover, in co-operation with the Dow Chemical Co. A copy of the Data Sheet is being sent you. I will be happy to send your inquirer a sample of this new material, without any obligation on his part.

The reason I am making this offer is that he states that he has not yet been able to find a paint remover that will do the job. I have reason to believe that this will. This item is not yet in production but I have sufficient material here to mail out the sample. —CLAUDIUS NIELSEN, Research & Consulting Chemist.

## More Interest in Hot Lacquer

We refer you to page 90 of your April 1944 issue of INDUSTRIAL FINISHING. You advised R. C. Ltd. (England) that you were forwarding a list of manufacturers of equipment for spraying lacquers hot; also concerns who supply lacquers formulated to be sprayed hot.

We request that you mail us the names and addresses of the same firms. We may be interested in applying hot lacquer to our production of aircraft and civilian seating.—C. P. Co. (Office Equipment).

On page 90 of the April issue you mention that you had sent a list of manufacturers of equipment for spraying lacquer hot to one of your correspondents in England. We will appreciate a copy of the same list.—T. H. Co. (Stringed Musical Instruments).

## Zinc Plated Surfaces

On page 90 of your March INDUSTRIAL FINISHING, we note that a manufacturer of metal furniture is having some difficulty in the application of enamel over Electro Zinc Plated surfaces. We manufacture, among other products, Electro Zinc Plated material, and have had considerable experience with the use of this material in connection with enamels and lacquers. If you will be so kind as to supply us with the name of this company we would be very glad to see if we could be of any help.—WEIRTON STEEL CO.

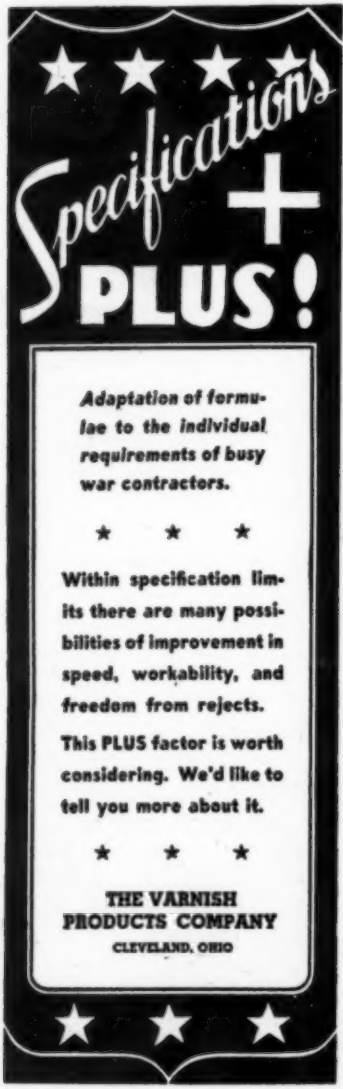
## The Shellac Situation

On April 21, 1944, the WPB revoked Allocation Order M-106 and so ended the need of shellac dealers and consumers obtaining the approval of the WPB in order to buy or use shellac.

The Order was revoked because of the opinion of the WPB that the Government stockpile of shellac is sufficiently large to take care of war needs for a considerable future period.

Actually, that stockpile consists, for the greater part, of high grades of orange shellac. . . .

The revocation of the Allocation Order should not mislead you into believing that you will be able to obtain adequate supplies of all grades of shel-


Specifications
+
PLUS!
Adaptation of formulae to the individual requirements of busy war contractors.
Within specification limits there are many possibilities of improvement in speed, workability, and freedom from rejects.
This PLUS factor is worth considering. We'd like to tell you more about it.
THE VARNISH PRODUCTS COMPANY
CLEVELAND, OHIO

lac for all purposes. There is still a great scarcity of those grades of shellac which are needed by American consumers and particularly of the grades from which bleached shellac is produced, so that bleached shellac and the ordinary grades of orange shellac will undoubtedly remain scarce for some time to come; probably until the Government again permits the resumption of imports by the shellac importers and bleachers.

The WPB has also reduced by 50% the amount of ethyl alcohol which will be allowed to be used for the cutting of shellac and shellac substitutes. This would necessarily retard shellac consumption, even if ample supplies thereof were available.

All commodities, including shellac, still remain subject to the Priorities Regulations of the WPB so that shellac importers, bleachers and dealers will have to first fill orders carrying priority ratings in the order of their rank, after which such material as may remain will be available for essential civilian and other needs in the order of their importance.

It should be frankly realized that until supplies become far greater than they promise to be within the immediate future, there will not be enough shellac available to fill all orders.—AMERICAN BLEACHED SHELLAC MANUFACTURERS ASSOCIATION, INC.

## Phosphorescent Paint

Can you tell us whether there is a phosphorescent paint on the market that can be successfully applied over steel surfaces, and stand up and give good service?

It seems to us that in one of your previous issues of INDUSTRIAL FINISHING there was an item regarding phosphorescent paints . . . but in looking back through our file we have been unable to locate same.—C. MFG. CO.

We are sending you names and addresses of some manufacturers of phosphorescent paints.—ED.

## Wax; Pumice; Tumbling

Could you advise us where we might secure some hard South American Carnauba Wax for use in tumble finishing?

We would also like to get in touch with a supplier of FFF pumice for use in securing a smooth tumbling finish on hardwood pieces.

Do you have available any data covering tumbling generally; that is, on tumbling for smoothing up materials prior to finishing, wherein the materials are run through a circular action sanding apparatus, leaving a

TOUGH . . .
HARD . . .
MAR PROOF . . .
Flo-Bake
A HIGH SPEED baking synthetic . . . resistant to grease, oil, alkali, alcohol and mild acids . . . Widely used on hospital furniture, Signal Corps apparatus, galley equipment, control instruments, etc.
Bakes in ten minutes at 300 degrees to a hard protective coating with great adhesion.
Full information and samples on request.
WRINK-ALL, a proven product, has all the characteristics of old type wrinkle in appearance, uniformity, application, baking schedules, etc. Available in all shades and colors.
LACQUERS—THINNERS
METALLIZED FINISHES
SYNTHETICS AND
SPECIAL COATINGS
FOR ALL SURFACES
United Lacquer Mfg. Corp.
General Offices, Laboratory, Factory: LINDEN, N. J.
NEW ENGLAND MFG. DIVISION, BOSTON, MASS.
BACK THE ATTACK! BUY WAR BONDS!

Perfection
Synthetic
FLAT
FINISHES
FOR A FULL RUBBED EFFECT
Without Rubbing

● Perfection Flat Finishes are made by chemically treating fossil gums. This flat is then blended with gloss varnish to give the desired sheen. The result is a water-proof, liquor-proof finish with a beautiful rubbed effect (without rubbing); a perfectly clear finish that brings out all the beauty of the wood and the stain. A full range of sheens.

Perfection
PAINT & COLOR CO.
INDIANAPOLIS 2, INDIANA

fuzz or fine down on them? We have been tumbling these pieces to remove this with fairly good success. We would like to hasten this action by including in the barrels some FFF pumice.

We are thinking too, of finishing by means of tumbling on certain parts, after they are either dyed with water dyes or other types, and then placing a highly polished wax finish on them by tumbling.

Could you advise us where we might secure these stains in brilliant colors, and also the wax to use in finishing them?

Any help you might offer us in connection with tumbling, and sources of tumbling materials will be greatly appreciated.—A. P. Co. (Joy Boy Toys).

Information supplied by letter.—ED.

## Metal Finish

Will you kindly tell us where we may obtain information on a metal finish described in an article which you published by S. P. Wilson, Ph.D.? —T. & E. Co.

We are referring your question to Dr. Wilson and feel sure he will reply promptly.—ED.

## Roller Coating Machines

I would appreciate it if you would send me a list of roller coating machine manufacturers, suitable for handling ¼-in. stock.—T. M. A.

In a recent copy of INDUSTRIAL FINISHING magazine there was an inquiry for a list of manufacturers who make machinery for roller coating strip steel. We are also interested in a coating machine of this type . . . . —A. E. Co.

Information furnished.—ED.

## Can Supply Toy Enamel

The April 1944 issue, page 92, contains an inquiry for toy enamel from "B. W. Co.". We would appreciate having the name and address of this manufacturer forwarded to us at once, as we manufacture a line of toy enamels.—O'BRIEN VARNISH CO.

## Will Color Razor Blades

Will you give us the full name of the "A. P. Corp." who are interested in a lacquer for coloring razor blades (March issue)? We have a good proportion of this business now and would like to communicate with the "A. P. Corp."—RANDOLPH FINISHING PRODUCTS CO.

# NOVO-LITE

***Novo-Lite*** is being manufactured to take the place of lacquers made from critical raw materials.

***It is supplied in the* CLEAR, *in* GLOSS, SEMI-GLOSS, *or* FLAT, *and can also be pigmented.***

It is somewhat heavier than the regular run of critical lacquers. As to reduction, it should take the same amount of reducer or thinner, or a little more, than is used for critical lacquers of similar type.

Novo-Lite can be thinned with our Novo-Lite Reducer or with our Synotol Thinner. Dries a little more rapidly if Synotol is used.

***The Price is Competitive***

We recommend under Novo-Lite either our Novo-Lite Sealer or our E-5099 Sealer. Both non-critical. Follow with Novo-Lite Gloss, Semi-Gloss, or Flat. Gloss Novo-Lite will produce a beautiful rubbed effect, and is not hard to rub.

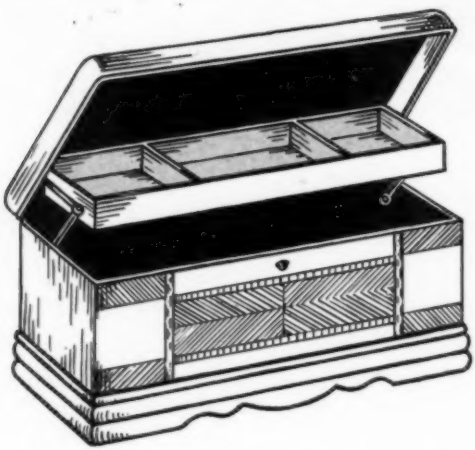
Novo-Lite lacks nothing in durability as compared to critical lacquers, and will stand the same tests. Novo-Lite is a product of high quality in itself, not just a substitute.

***Can stand comparison to any type of critical lacquer heretofore manufactured.***

## STILLE-YOUNG

MANUFACTURERS: LACQUERS · FILLERS · STAINS · ENAMELS · PAINTS

2300 North Ashland Avenue — Chicago 14, Illinois



# Coat the Trays in Cedar Chests with

## *Cellusuede* FLOCK

Another example of how Cellusuede Flock is being used to give a soft smooth finish and enrich a product at low cost.

Being easy to apply to almost any surface, manufacturers are finding hundreds of uses for Cellusuede Flock. Furthermore it is available for immediate shipment. No rationing, no priorities, no red tape! Try a flock application on your product. See what rich velvet, velour and suede effects you can get quickly and inexpensively.

*Write for color card, samples and prices.*

CP *Cellusuede Products, Inc.*
ROCKFORD, ILLINOIS

# Postwar Planning in STRIDE

• Preparedness to meet future production requirements and current changing needs is the steady objective of Glidden research.

Experience, observation of specific processes and trends, and customers' suggestions establish our objectives.

Problems that were considered impossible of solution have been, through cooperative effort, answered in a practical way.

Many step by step developments anticipated for current usage have been eliminated for the duration, but each and every one of them represent a forward step and have a definite place in postwar production.

Your current or prospective production problems represent a challenge which we will accept. Product designers, engineers and production executives are invited to make use of Glidden national research facilities. Just drop us a line.

THE GLIDDEN COMPANY
CLEVELAND 2, OHIO

TIME-TESTED

**SURFACENE COMBINATION STAIN AND FILLER**

One coat application against conventional two coats.
Saving — one application — one handling.
Five hours air dry for recoating, against 48 hours normal dry of Water Stain and Filler.
One hour dry at 140° F. with controlled humidity.
Clarity of Water Stains.

★ ★

Also Surfacene Pigmented Wiping Stains, Glazes and Toning Stains.

**GLIDDEN** *Pacemaker in Paints*

available

*You've waited a long time for this Announcement!*

NOW!*

## SYNCHROME ALUMINUM PAINT

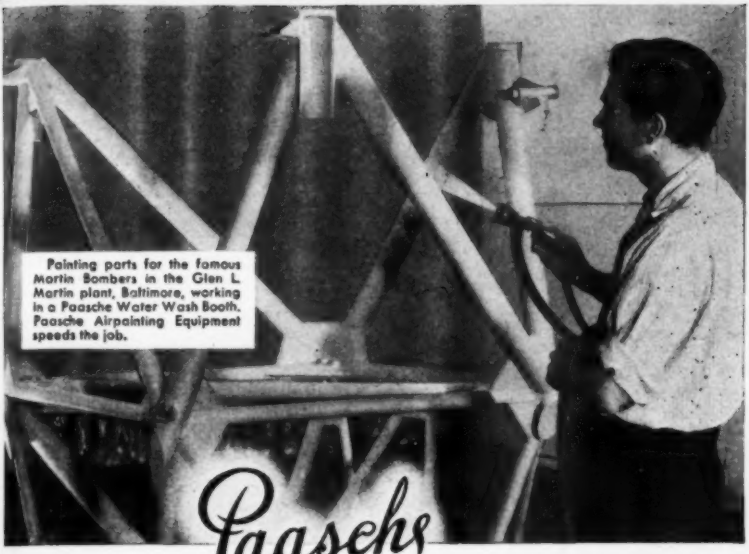
You've waited patiently for CRES-LITE Ready Mixed SYNCHROME ALUMINUM PAINT. *Now* it is again available for an extensive list of uses, on orders carrying AA-5 or higher preference rating.

*Write at once* for complete details of WPB permitted uses.

*For any of the uses permitted by WPB on AA-5 rating.

**CRESCENT BRONZE POWDER CO.**

120 W. ILLINOIS STREET • CHICAGO 10, ILLINOIS



Painting parts for the famous Martin Bombers in the Glen L. Martin plant, Baltimore, working in a Paasche Water Wash Booth. Paasche Airpainting Equipment speeds the job.

# Paasche
# WATER WASH BOOTHS

## Conserve Paint • Add Production Hours • Reduce Fire Hazards • Promote Healthful Working Conditions

Paasche Water Wash Booths employ a constant curtain of water and the action of powerful sprays in a two-stage precipitation chamber, to wash down the overspray that otherwise accumulates on walls of booth, fans, piping, etc. Under proper conditions, the solids precipitated by this method can be reclaimed to make a substantial paint saving!

Further, Paasche Water Wash Booths eliminate time-wasting and hazards in spray-booth cleaning. They reduce fire danger to a minimum and are endorsed by safety engineers and industrial commissions. The clean, healthful working conditions they provide are an important factor in promoting favorable employee relations, and savings realized by the installation of Paasche Water Wash Booths quickly pay for the original investment.

Write for new Paasche Catalog. Gives full information on Water Wash Booths and other Manual and Automatic Airpainting Equipment. You'll want it for quick reference. **Address Paasche Airbrush Co., 1917 Diversey Parkway, Chicago 14, Illinois.**

Paasche Airbrush (Canada), Ltd., 110 Elm Street, Toronto, Ontario.

Paasche AIRPAINTING EQUIPMENT

Manual, automatic and special airpainting equipment, airfinishing booths, pressure regulators, airconditioners for compressed air lines, air dusters and stripers.

# Do you know...? Quiz on wartime

**Q.** Recognition symbols on planes are usually applied with:
☐ Paint Brush ☐ Spray Gun
☐ Roller

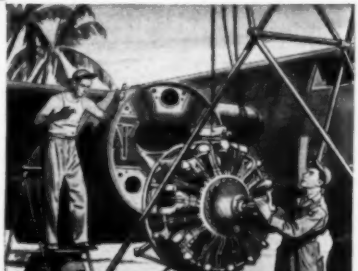
**A.** Symbols are first masked with paper masking tape—then painted on with a spray gun. Because it sticks at a touch, strips off clean and leaves a sharp, straight edge, Permacel masking tape is also used in painting airplane engines, radio cabinets and hundreds of other items of wartime equipment.

**Q.** What part will color play in streamlined trains of tomorrow?
☐ Speed ☐ Decoration ☐ Insulation

**A.** Decoration. Modern railroad designers are turning more and more to bright colors to give beauty and individuality to exteriors and interiors of railway cars and locomotives. Tomorrow, as today, jobs calling for two or more tones can be finished quickly, neatly, economically, with Permacel masking tape.

**Q.** Airplane fuel lines are identified with:
☐ String ☐ Colored tape ☐ Tags

**A.** Permacel's companion, Texcel cellophane tape, in a variety of colors, speeds identification and repair of battle-damaged fuel lines, oxygen lines and cables. Indispensable for industrial uses, this quick-sticking, durable cellophane tape will also find many applications on post-war packaged products.



## short-cuts useful for peacetime production—No. 2

**Q.** Guess how much tape is put on a medium tank shipped overseas.
☐ 10 square yards ☐ 15 square yards
☐ 60 square yards

**A.** About 60 square yards of Permacel moisture-proof cloth tape (Utilitape) go on a medium tank shipped overseas—to protect vital parts against corrosion. After the war, Permacel moisture-proof tape will help open new world markets for manufacturers whose products must be able to stand overseas shipment.

**Q.** After the ring is pulled, a hand grenade explodes in about:
☐ 4 seconds ☐ 8 seconds
☐ 10 seconds

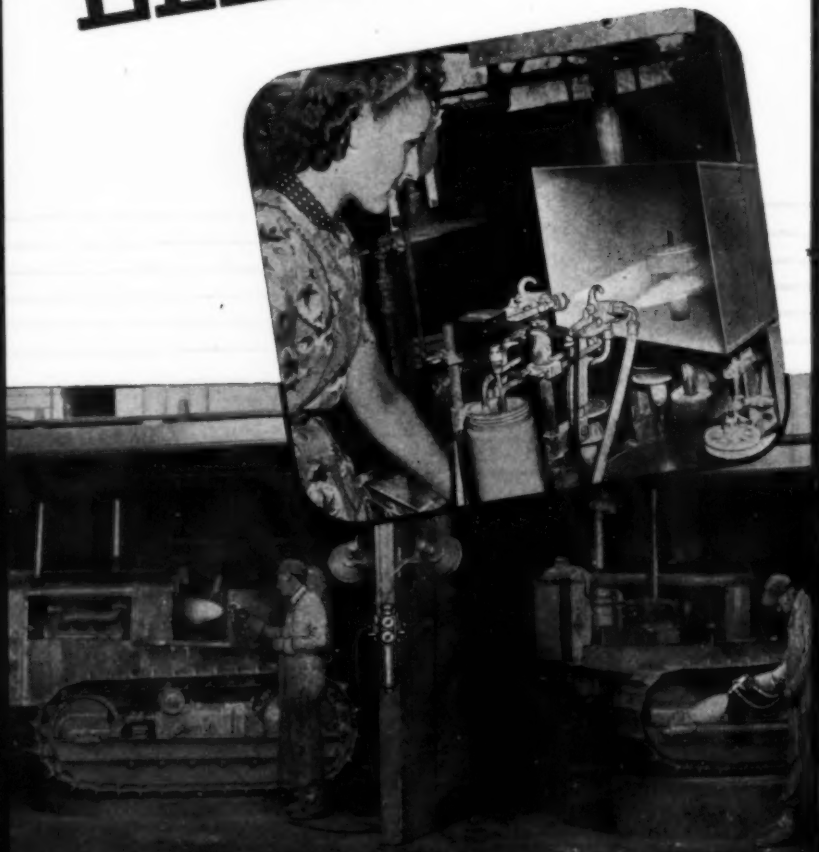
**A.** Four seconds. To insure uniformity of fuse-burning time in hand grenades, a special Permacel metal tape (Metacel) is used to seal moisture out of the fuse chambers. When the war is over, this amazing tape will be equally at home as a product-sealer or as an indoor aerial under your rug.

**Q.** Which of these types of pressure-sensitive tape can help speed and improve *your* production?
☐ Paper ☐ Cloth ☐ Cellophane
☐ Metal ☐ Glass

**A.** All of these types of Permacel tapes are today used in war production. Many war uses will prove helpful in your business when you return to post-war work. Meantime, our research laboratory facilities are available to you for development of special tapes to fit war or post-war needs.

**Permacel**
**Industrial Tapes**
INDUSTRIAL TAPE CORPORATION
*New Brunswick, N. J.*
*Makers of* Texcel Tape

# DeVilbiss Guns help produce ELECTRONS



# nd TRACTORS
## for War Duty

• Here are two widely-diversified ways in which DeVilbiss Spray Guns are working for Victory. Between them you may find methods to help speed your war output—and lay the groundwork for better peacetime production.

At the Electronic Tube Division of The Tung-Sol Lamp Works, twin DeVilbiss Guns put a uniform coat of electron-emitting material on the tiny cathodes of electron tubes—spraying from 25 to 50 at a time. And in sharp contrast is the work of DeVilbiss Guns in giving those big, husky Allis-Chalmers tractors a hard, protective finish.

Hundreds of the very latest DeVilbiss Systems are doing many different finishing jobs in war production—with greater speed and efficiency. And this equipment need not be discarded when peace comes. For the DeVilbiss Line is engineered for easy, economical conversion.

So, if postwar obsolescence has held up purchases of new and faster war finishing equipment in your plant, get in touch with a DeVilbiss spray engineer now.

THE DEVILBISS COMPANY • TOLEDO 1, OHIO
Canadian Plant: WINDSOR, ONTARIO

DE VILBISS
*Spray Systems*

SPRAY EQUIPMENT • EXHAUST SYSTEMS
AIR COMPRESSORS • HOSE AND CONNECTIONS

View in water-wash spray booth where facilities are available for operators to stand at different levels while spraying parts moved through by conveyor.

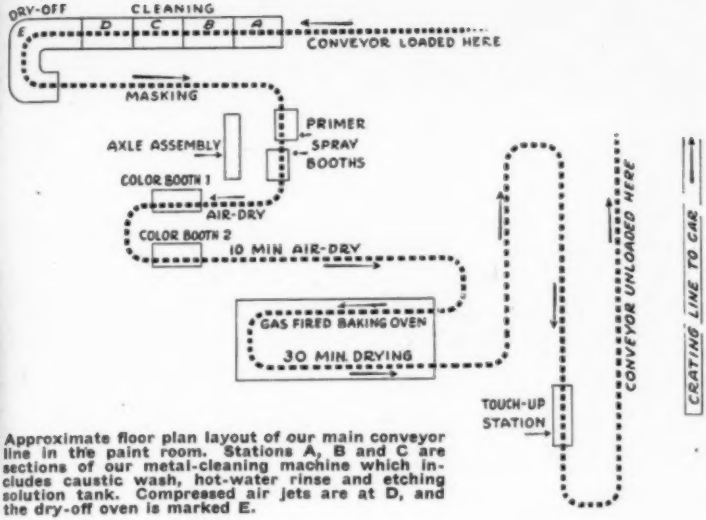
# Production Painting of

THE GERSTENLAGER CO., of Wooster, Ohio, has long been known as one of the country's leading manufacturers of fine custom-built bodies for trucks and trailers. To abruptly change from this peace-time work to the manufacture of 2-wheel, 1-ton cargo trailers, on a conveyorized volume production basis, to fill a Government contract, is a fine tribute to the company's engineer. However, this change was not accomplished without many headaches and problems. The work was new to everyone. Also, most of our workers were inexperienced; but in a short time, by hard work and careful instruction, we built a capable and efficient organization.

We started out far behind schedule, using hand-cleaning and air-drying methods, but within a period of three months, we had met and passed our quota of 1-ton all-steel cargo trailers. Also, we had reached and passed our quota of the accompanying spare-parts contract. During the past year many thousands of our trailers have been placed in service at the various combat zones. Both the management and the employees are justly proud of this fine record.

### Conveyorized Line Through Cleaning, Painting, Drying

A floor plan layout showing part of our conveyorized cleaning-painting-drying production line is included among the illustrations with this article. The various parts that make up a complete trailer unit, such as fenders, wheels, tailgates,




Approximate floor plan layout of our main conveyor line in the paint room. Stations A, B and C are sections of our metal-cleaning machine which includes caustic wash, hot-water rinse and etching solution tank. Compressed air jets are at D, and the dry-off oven is marked E.

# Cargo Trailers

**BY DALE MUSSELMAN**
**Finishing Foreman**
**The Gerstenslager Co.**

etc., are suspended from special hangers under the continuous moving overhead conveyor line.

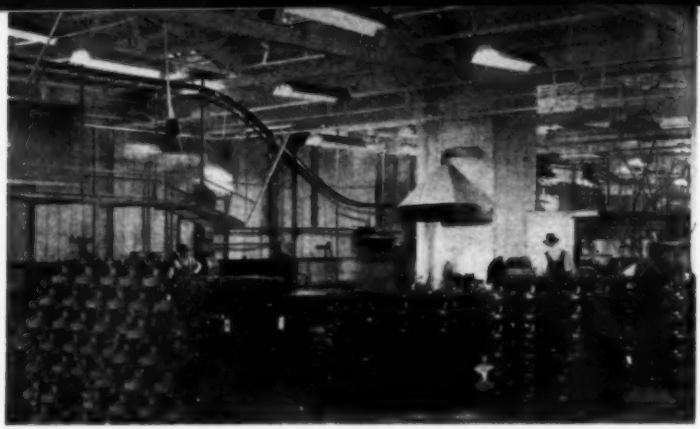
The conveyor line first moves through a large automatic cleaning machine, where each metal part receives: 1) a caustic spray wash to remove all surface grime and grease; 2) a hot water rinse; 3) a final etching wash solution. Each tank in the cleaning machine is maintained at a specified temperature, and all are equipped with spray nozzles set at all angles so that every square inch of surface of the parts receive the benefit of the solutions.

From the etching tank the parts move past a series of compressed air jets which blow the surface moisture off the parts as they move along by conveyor. To further dry the parts, in preparation for painting, the conveyor carries them through a gas-heated oven wherein the temperature is 325°F.

The axle assembly is the only metal part of the unit that does not pass through the cleaning process just described. The inspection department felt that the strong cleaning solutions might injure the finished bearing surfaces, or get mixed in with the grease in the hubs if they were put through the conveyorized cleaning machine. All axle assemblies are hand washed with a special cleaning solvent.

### Rust-Inhibitive Primer Plus Olive Drab Paint

From the dry-off oven the warm parts pass through two alternate paint spray booths (one right



The conveyorized automatic cleaning equipment appears in the background.

hand; one left hand) where they receive one coat of rust-inhibitive primer, as specified by the Government. Primed parts then have a 6-minute air-drying period before entering two more paint booths (right hand and left hand) where they receive their final coat of special lusterless olive drab enamel. By maintaining just the proper balance of solvents in the primer, plus the warm condition of the parts when they are prime coated, the prime coat dries sufficiently, in the 6-minute period of travel between the prime coat and color coat booths, to be in condition to receive the final olive drab coating. After leaving the color booths the parts receive approximately a 10-minute period for air-drying before entering the baking oven wherein they receive a 30-minute bake at 250°F. They emerge from the oven ready to pack.

Before removal from the conveyor line in the crating department, each part is carefully checked and given any touching up that may be needed. This work is done with specially matched touch-up paint, applied with a touch-up spray gun. Tailgates are removed from the line and the U.S.A. number for each unit is stenciled on them. Special gummed stencils are used so the blue drab stencil color can be sprayed on with a small spray gun.

The complete trailer units are packed two to a box. The box is sealed to make it moisture proof and its identification and destination are stenciled on the sides and ends. We use special stenciling jigs and black stencil ink for this work. The stenciling on one side and one end of each box receives a spray coat of varnish before the box is moved from the roller conveyor onto the loading dock and into the freight car for shipment. This adds to the durability of the stenciling.

**Water-Wash Spray Booths; Paint Supply Line**

All of our spray booths are equipped with modern waterfall systems and efficient exhaust fans. Both the prime-coat and color-coat booths are arranged so that each spray gun operator has his specific item or part or area to coat. Special platforms and also pits, have been installed to make the

work hanging from the conveyor easily accessible for the operators. This is shown in one of the pictures that accompany this article.

Both the prime-coat and color-coat booths are supplied with paint from 60-gal. pressure tanks. The paint is forced by air pressure from the tank into a dead end piping system from which it is distributed by shutoff valves to the material hose and spray guns of the spray operators in each booth. The piping system is so arranged by a double valve, that material tanks may be changed without stopping the line.

In the prime-coat booths we have four spray gun stations, two to each booth; and in the color-coat booths there are six spray gun stations, three to each booth. Each operator is supplied with air pressure from a separate regulator so that the proper pressure can be maintained to suit individual needs. Special hangers have been installed to keep the guns and hose in clean orderly condition when not in use.

**Paint Mixing Room; Check on Viscosity**

One man takes care of the paint mixing, checks viscosity carefully, and sees to it that there is always a full tank of paint ready when one becomes empty. The mixing room is a short distance away from the painting department. It also serves as storage space for drums of paint, solvents, etc. Tanks of paint are transferred between mixing room and booths on a special truck designed for this purpose. The maintenance of the spray booths, pressure tanks and spray guns is taken care of by the paint department. Material in the pressure tanks is kept agitated continuously to prevent any paint pigment from settling.

Each trailer unit is equipped with a set of wood racks (two sides and two ends). The wood-

View showing part of one of the prime-coat water-wash spray booths where one of our woman operators is spraying. Notice the 60-gallon container at right.

rack lumber is given a coat of toxic sealer by dipping. After thoroughly drying, the dip-coated wood parts are given a dip coat of gray wood primer. They are allowed to drain and are then stacked for drying. The racks are assembled and given a final spray coat of olive drab enamel while hanging from a separate conveyor line. They are removed from the line and placed on special drying racks to air dry. The spray booths for wood racks are constructed the same as those on the main conveyor line, and are supplied with paint in the same way. There is one spraying station in each booth.

Metal parts for the wood racks are thoroughly cleaned in a solvent tank and given a dip coat of rust-inhibitive primer before the racks are assembled. Other small parts for the main line are treated the same way.

Some of the smaller items are coated by tumbling, after which they are spread out on screens and dried by infra-red lights. Some small parts and all bearing surfaces are treated with a special rust-retarding compound before shipment.

**Small Parts Production; Masking; Women Workers**

In addition to manufacturing the main units and their accompanying spare parts, our company has also furnished spare parts for 17 other companies engaged in the same line of work. This mainly entails the painting, packing and shipping of the various parts. The majority of parts are taken through on the conveyor line and receive the same treatment accorded the unit itself. Any bearing surface or part that might be susceptible to corrosion is carefully treated with one of our various rust-preventive compounds.

Special hangers have been constructed to carry each part. Some of the parts require masking to protect the bearing surfaces from etching and paint. This is done at strategic points along the line. We also use the wood-rack conveyor line for painting certain other parts. The small parts are cleaned and receive a dip coat of primer and one coat of olive drab paint.

Due to the scarcity of male labor in our locality, we have been obliged to employ a number of women. In the finishing department, several women have taken over key spraying stations. Practically all the dipping is taken care of by women. The stenciling and touch-up work are handled exclusively by women. We have found them to be capable, conscientious workers.

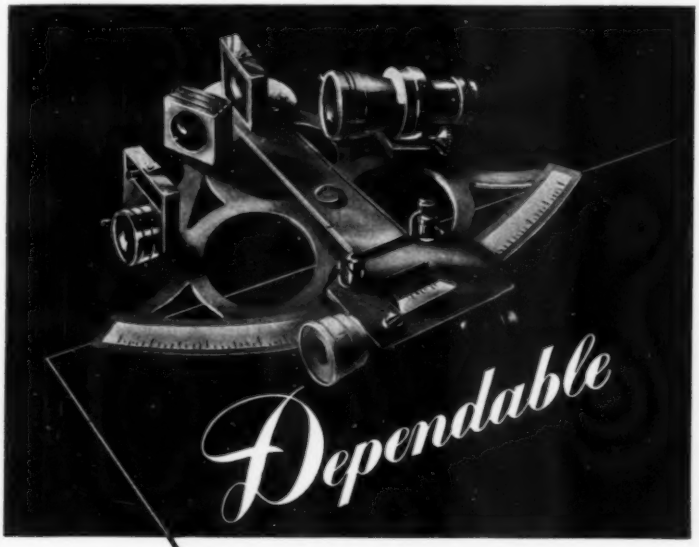
NOTE: Since writing this article we have finished our contract, and are at the present time converting our plant and production line to do another important war job for the Government. I feel certain that we will be able to do it just as efficiently and satisfactorily as we have made trailers.

A word of praise must also be given to the inspection department —both our company's and the Army Ordnance—for helping everyone to maintain, at all times, the high quality of workmanship that has made this job a success. Their vigilance and eagerness to help in any way has been a large factor toward this end.

---

## Calcium Chloride Folders

A dozen or more different illustrated folders about calcium chloride, its various uses and possibilities, have been compiled and published by Wyandotte Chemicals Corp., Wyandotte, Mich. Each folder is printed in two colors and folds to a size of about 3x6-in.

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# THE THEORY AND USE OF
# *Zinc Chromate Primers*

**BY PAUL O. BLACKMORE**
**Director, Products Engineering & Development Laboratories, Ault & Wiborg Division of Interchemical Corporation**

**Zinc chromate primers can be obtained in many different formulations, and with varying characteristics, including air drying and baking types. Why zinc chromate primer is used; how it protects the surfaces of metal from corrosion; how to use it to get best results; what tests and precautions to observe when you are using it.**

IF EVER it can be said that any good was derived from World War II, high on the list of assets will be the scientific achievements that were forced to much earlier conclusion by the hectic pressure of necessity. The miracles of synthetic rubber, high octane gasoline, electrolytic tin plate, tungsten, and many others bear witness to American ingenuity.

For most of us the daily routine of living has undergone a profound change. Our world has become a maze of A, B, and C stickers, ration points, draft boards, and taxes. Those of us who are fighting the war by helping the armed forces in their battle of production are manufacturing strange new things and testing them in strange new ways. We are beset with mountains of Government specifications which we must analyze and follow to the letter. Sometimes we feel certain that they were conceived solely for the purpose of making life as unhappy and as complicated as possible, but if we are honest with ourselves, we shall have to admit that in many instances they have taught us valuable lessons in product design, manufacturing control, and testing procedures which will be of inestimable value in our postwar industrial activities.

One of the things that has forcibly been called to our attention by government specifications is the value of zinc chromate as a primer pigment. Practically every branch of the armed services has a specification covering a zinc chromate primer, the use of which is mandatory in the protection of metallic surfaces on everything from aircraft to land mines.

It is said that fifty million Frenchmen can't be wrong, and, by the same token, the practically universal acceptance of zinc chromate primers would seem to justify the assumption that they must constitute something worth while. It is the object of this discussion to present some of the theory governing the action of zinc chromate

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primers and to offer some suggestions which, it is hoped, may be helpful in enabling users of primers to get the maximum performance and durability from them.

### Why We Use a Primer; What Its Purpose Is

The question is frequently asked, "Why must I use a primer?" The answer is that it is seldom possible to build into a single coat, all of the properties that are desired in a finish. It is generally conceded that primers should perform the following functions:

1) Create a maximum of adhesion to the surface on which the finish is to be applied.

2) Provide additional impedance to moisture, corrosive atmosphere, or other deteriorants which may constitute part of the environment to which the finish is subjected.

3) To fill or seal pores or metal imperfections, thereby imparting additional "build" or "fulness" to the system.

Frequently, the binders, or "vehicles" as they are sometimes called, that provide the best adhesion and corrosion resistance are not the best for color retention or lasting gloss; or they may be so dark in color and have such a high staining power that the colors obtained are muddy and unattractive. Most primers contain corrosion-inhibiting pigments such as zinc chromate, red lead, basic lead chromate, etc., which immediately limit the range of possible shades to those which will tolerate considerable quantities of the yellow, red, or orange shades of those pigments.

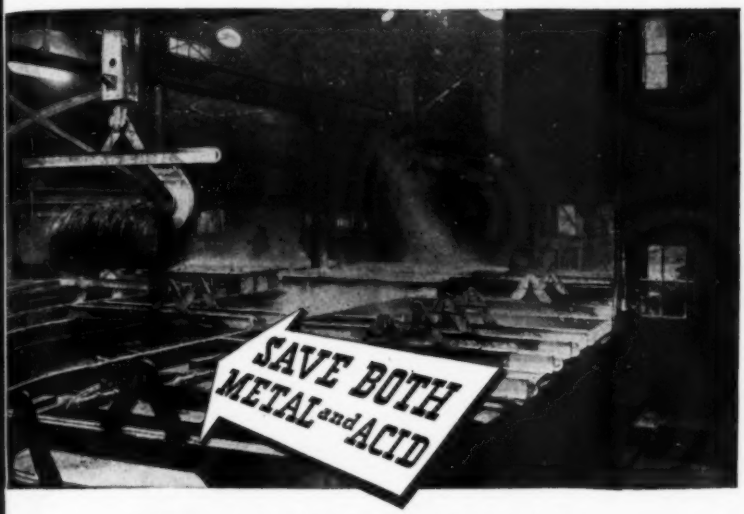
Thus, it will be seen that a one-coat finish must be a compromise between adhesion and corrosion resistance on one hand, and lasting gloss and clean, attractive, permanent colors on the other. There are a great many cases where such a compromise is entirely satisfactory. However, where a finish is to encounter a highly corrosive environment, a corrosion-inhibiting primer is certainly indicated. This is particularly true of some alloys of aluminum and magnesium which have come to the front as important materials in the fabrication of our fighting aircraft.

### Differences and Variation in Zinc Chromate Primers

The name "Zinc Chromate Primer" on the label of a package tells the consumer just one thing, namely, that the primer contains some of the now familiar lemon-yellow pigment, zinc chromate. This bit of information is meager and of little or no value. It doesn't tell whether the zinc chromate pigment is present to the extent of 1% or 50%. It doesn't tell whether the vehicle is oil, phenolic, alkyd, or plain rosin. It doesn't tell whether the solids contained therein total 6% or 60%. Since all of these things, and others too, contribute to the success or failure of the primer, it is evident that the "zinc chromate" designation on the label does not necessarily elevate the contents of the package to the Tiffany class.

There are many more zinc chromate primers than there are paint manufacturers. Each manufacturer has several primers which have been formulated for various and sundry end uses. There are also as many zinc chromate primer specifications as there are paint-consuming branches of the Government and the armed forces. Each formulator and each writer of specifications has his own ideas as to what constitutes a good formula.

The table in Fig. 1 shows the composition of a few of the most




**Needless waste of critical materials is inexcusable in the present war emergency when scarcities exist in essential supplies and in manpower to produce them.**

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not only prevents overpickling, minimizes acid embrittlement and saves both acid and metal but it makes possible increased production.

The inhibiting principle of Rodine, which confines the action of the acid in the pickle bath to the removal of scale and rust from iron steel and steel alloys, is generally recognized but it is not so well understood that there are many types.

## Types of Rodine

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commonly used specification primers. Thus it will be seen that when you speak of zinc chromate primer this can mean nothing but a very broad, generic classification of the material in question.

### Protecting Steel Surfaces From Corrosion

That steel can be protected from corrosion by coating it with a thin film of metallic zinc is well known. This fact can be ably demonstrated by the simple expedient of pounding two steel nails into a block of wood, one of them directly into the wood, the other through a thin sheet of zinc and thence into the wood. If the block is now subjected to a rust-producing environment, the nail driven directly into the wood will rust quickly, whereas the one driven through the zinc, if it rusts at all, will rust at a

| SPEC. NO. | % ZINC CHROMATE | % ASBESTINE | % IRON OXIDE | % OTHER PIGMENTS | TYPE VEHICLE | TOTAL PIGMENT % | TOTAL SOLIDS % | WEIGHT PER GALLON IN LBS. | VISCOSITY | COLOR |
|---|---|---|---|---|---|---|---|---|---|---|
| Bureau of Ships 52-P-18 | 24.0 | 11.4 | 2.2 | 6.9 | A-B | 44.5 | 65.5 | 11.2 | 72 K | Y |
| Air Corps 14080 | 25.5 | 4.5 | | | O | 30.0 | (2) 28.0 | O | 15-20 CP(1) | Y |
| Army-Navy Aero. AN-TT-P-656 | 28.0 | 5.0 | | | B-C | 33.0 | 65.0 | 9.8 | 25 CP(1) | Y |
| Ordnance AXS-750 | 3.2 | | 16.1 | 26.7 | B-D | 46.0 | 65.0 | O | 75-150 (3) | R |
| Ordnance AXS-946 | 5m | | 25.2m | 45.8 | B-D | 72.0 | 60.0 | O | O | R |
| Ordnance ES-680-101 | 5m | | 25.2m | 45.8 | B | | | | 75-150 (3) | Br |
| Ordnance PXS-783 | 28.0 | 5.0 | | | B-C-E | 33.0 | 60.0 | 10.0m | O | Y |
| Navy Aero. P-27-B-2 | 28.0 | 5.0 | | | B-C-E | 33.0 | 60.0 | 10.0m | O | Y |
| AMS-3110 | 46.8 | 8.2 | | | B-C-E | 55.0 | 60.0 | 10.0m | 50 CP(1) | Y |

KEY

A Drying Oil-Phenolic Resin Varnish
B Alkyd Resin
C Dispersion Resin
CP Centipoises
D Drying Oil-Ester Gum Varnish
E Congo Copal
Br Brown R Red Y Yellow
m Minimum
O Optional
K Krebs Units of Viscosity
(1) Viscosity after reduction
(2) Solids after reduction
(3) Seconds—No. 4 Ford Cup

Fig. 1—Table showing the composition and constants of several of the commonly known specification zinc chromate primers used for various war products.

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point farthest from the point of contact with the zinc. Thus the zinc protects the nail from rusting over a considerable area with which it has no direct contact.

It can also be noted that when a piece of zinc-coated steel is sheared, the bare steel edges thus exposed do not rust readily due to the fact that the protection of the steel by the zinc extends beyond the sphere of actual metal to metal contact.

This "reaching power" of zinc is thought to be due to eddy currents set up in the steel because of the difference in electrical potential between iron and zinc. The presence of zinc chromate in a primer sets up a similar set of conditions due to the "electrolytic dissociation" of the pigment.

### How Zinc Chromate Acts In Its "Electrolytic" Protection

In 1887 Svante Arrhenius advanced the theory that when a substance dissolves in water it dissociates into its electrically charged atomic particles known as "ions." If these ions are positively charged they are known as "cations." If they are negatively charged they are called "an-ions." Water itself, in the presence of an electric current, dissociates into hydrogen cations ($H+$) and hydroxyl anions ($OH-$). Zinc chromate has a rather high degree of water solubility, and when it passes into solution dissociates into zinc cations ($Zn++$) and chromate anions ($CrO_4--$). The moisture is provided externally from water vapor in the atmosphere, or rain.

Since all films are permeable to a greater or lesser degree, enough of this moisture penetrates the film to provide the necessary dissociation. In the absence of moisture, no dissociation takes place. Likewise, in the absence of moisture no electrolytic corrosion takes place. Therefore, the zinc cations are not needed until the environment that causes the corrosion also brings about the protective dissociation of the zinc chromate.

### Effect of Moisture on The Vehicle Used

It is an established fact that where a vehicle is used in the primer that has a high degree of moisture impermeability, the effectiveness of the zinc chromate is sharply reduced, due to the fact that the degree of electrolytic dissociation is correspondingly lower. By the same token, since the presence of moisture is essential to corrosion, if the moisture impedance of the vehicle is sufficiently high, the metal will not corrode. Therefore, the wisdom of using large amounts of zinc chromate in a highly moisture impermeable vehicle is open to question. The use of some zinc chromate is probably justified by the fact, implied above, that no vehicle is entirely impermeable to moisture.

We have seen that in addition to the $Zn++$ ions we also have $CrO_4--$, $H+$ and $OH-$ ions present in the system. The use of chromic acid, $H_2CrO_4$, in the passivation of metals before painting is also a well established principle. When chromic acid dissolves in water it dissociates into $H+$ cations and $CrO_4--$ anions. Since these same ions are also produced by the dissociation of zinc chromate in the presence of moisture, we can expect them to exert some sort of a passivating action on the metal. Since chromates are also powerful oxidizing agents they tend to keep iron in the ferric state, in which state it is most stable. Thus, it will be seen that zinc chromate has a

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double-barreled action: 1) electrolytic or "galvanic" protection, plus 2) keeping the system in a state of passivity.

### What Percentage of Zinc Chromate Is Really Needed

The amount of zinc chromate necessary in a primer varies with the job to be done. In general it can be said that the greater the tendency for a metal to corrode electrolytically, the greater the amount of zinc chromate necessary to combat the electrolysis. Thus, a much smaller amount is necessary in a primer for steel than in one for magnesium. For metals that corrode easily, zinc chromate should be present to the extent of at least 20% based on the total formula. Recently conducted tests have indicated this figure to be the absolute minimum. Protection is also a function of film thickness, about which I will say more in subsequent paragraphs.

Zinc chromate pigments vary considerably in quality from various sources of supply. The degree of reactivity, the degree of whitening in water, the amount of soluble sulphates and chlorides, the tendency to settle hard or flocculate—these are all characteristics that are imparted during the manufacture of the pigment. Grinding procedures set up on a pigment from one source of supply may be entirely inadequate if that source is changed. The presence of free sulphates and chlorides is undesirable, particularly in primers to be used on magnesium which is unusually susceptible to them.

### Other Pigments Used with Zinc Chromate

Having disposed of the function of the zinc chromate, we may briefly turn our attention to the functions of some of the other more commonly used pigments.

One of the favorite pigment combinations for specification primers is 85% zinc chromate and 15% asbestine. (These percentages are based on total pigment solids.) Asbestine is finely ground magnesium silicate. Its presence is desirable for a number of reasons. It is low in cost, thereby functioning as a cheap pigment extender. Just as there is a minimum effective percentage of zinc chromate, so is there a maximum amount above which no additional protection is to be gained. Since both zinc and chromium come under the heading of critical metals, their conservation is desirable from a strategic as well as from an economic standpoint.

### How Asbestine Affects Zinc Chromate Primer

Asbestine, being fibrous in nature, imparts to the film a certain degree of toughness and adhesion, presumably due to the interlacing of the fibers, and to their interlocking in the interstices of the metal.

If properly ground, asbestine also serves to impede the settling of the zinc chromate, which is a rather bad actor in that respect. The degree of dispersion is rather critical, as most of us have discovered the hard way. If the pigment is under-ground, the film will be gritty and more permeable. Furthermore, the pigment will settle out completely, leaving the clear vehicle on the top of the package or the dip tank. The settled cake, however, will not be hard and will stir in readily.

If the pigment is over-ground, the suspension will be good, no clear liquid being visible. The amount of pigment that settles will

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be less, but the pigment that does settle will form a hard cake that is not readily reincorporated into the batch.

The ideal situation is a compromise between these extremes. The dispersion should produce suspension of the pigment to a point where no clear liquid appears, but it should be sufficiently flocculated so that enough large aggregates remain to prevent packing of the settled cake.

The balance is very delicate and difficult to maintain. Many factors influence the result. In the case of ball or pebble mill grinding, the ratio of the weight of the charge to the weight of balls or pebbles is important. In the case of roller-mill grinding, the consistency of the paste and temperature attained on the mill are important. Once having found a happy set of operating conditions they should be carefully maintained. Then all one has to worry about is the variation in activity from one batch of zinc chromate to another, the variation in acid number from one batch of vehicle to another, the presence of gels or flocculates in the vehicle, the viscosity of the vehicle, and a few other minor details.

**Preparation of Asbestine to Be Used in Z. C. Primer**

Some manufacturers prefer to grind zinc chromate and asbestine in separate mills in order that the degree of dispersion may be more carefully controlled. Asbestine is much more difficult to disperse than zinc chromate. Therefore, by the time the asbestine is adequately dispersed, the zinc chromate may be overdispersed. Furthermore, from the standpoint of mill efficiency, it makes sense not to grind 100% of the charge the same number of hours required by only 15%.

Other manufacturers prefer to grind to a state of complete dispersion and deliberately partially flocculate to prevent hard settling. This is done by the addition of a flocculating agent such as malic acid or maleic anhydride. This, too, is a critical operation, the flocculating agent being measured in tenths of 1%. An overdose will provide complete flocculation plus livering or gellation of the primer on standing, due to a reaction between the flocculating agent and the zinc chromate.

Therefore, if the primer tank in your product painting department sometimes provides a headache, perhaps there is some consolation to be derived from the fact that the fellow who made the primer had one too.

In addition to zinc chromate and asbestine, one often finds red iron oxide present in the formula. In my opinion, such an addition is

Painting shells on the production line.

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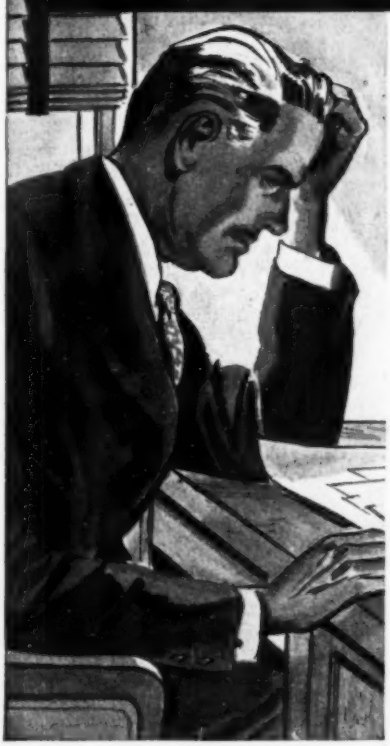

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highly desirable. It provides additional opacity which, depending on the circumstances, may or may not be too important. However, it definitely imparts a density and cohesiveness to the film that cannot be obtained solely from zinc chromate and asbestine. Examination of the film with a penknife discloses a much tighter film and the cut shows smooth beveled edges rather than jagged vertical ones. It is felt, in some circles, that iron oxide has a rust-inhibiting action of its own to augment that of the zinc chromate.

Other extender pigments may be used to provide density, fluffiness, or any of the other properties for which extenders are used. So much for the pigmentation.

### Vehicles Used in Zinc Chromate Primer

In considering vehicles, the same rules that govern the formulation of any finish apply also to zinc chromate primers. Resins or varnishes should be selected which will provide the best adhesion to the surface in question. They should allow the passage of enough moisture through the film to permit dissociation of the zinc chromate, but should not be softened by that moisture or lose their adhesion. For use with zinc chromate they should have an acid number of not over 15, and preferably under ten to prevent gellation in the package. They should not form metallic soaps at the film-metal interface. They should not be rotted or have their adhesion destroyed by the solvents in the top coat which is to be applied over them.

For all around performance, low acid number alkyd resins do an admirable job. Each formulator has his pet alkyds to provide adhesion on steel, zinc, aluminum, magnesium, or what-have-you. Sometimes he may wish to fortify them by the addition of 15% to 20% of a phenolic varnish, keeping in mind, however, that creating a too highly impermeable film reduces the justification for the presence of zinc chromate.

Oleoresinous varnishes are also good vehicles, although they are generally much slower in drying at anything like equivalent durability, and are more adversely affected by the presence of strong solvents in the top coats than are the alkyds.

### Fast Drying and Baking Zinc Chromate Primers

Several of the zinc chromate primers most commonly used in the aircraft industry are characterized by being extremely fast drying. In some cases the specifications demand that the primer be dry enough in five minutes to accept a top coat of lacquer or enamel. This drying speed is accomplished by the use of so-called "dispersion" resins. These resins have been carried to an extremely advanced state of polymerization during their manufacture which means, in effect, that the paint film has been pre-dried, and then brought back into a state of pseudo-solution or colloidal suspension in highly volatile solvents, it being necessary only to evaporate the solvent to restore the film to the dry state.

The films so obtained are fairly good but have a tendency toward brittleness and lose adhesion rather badly when overcoated with top coats containing strong solvents, particularly nitrocellulose lacquers. In my experience, in only a very few instances has the 5-minute recoating time been utilized. In most cases it may be anything from

# FIRST THINGS
## Must Come 1st

The war must be won before any activity is started that can possibly delay Victory by an hour. However, all authorities . . . in the government, in the military forces and business . . . recognize the need for advance planning if industry is to be successful in converting quickly to post-war production on a scale large enough to provide ample employment to sustain a high standard of living. If your plans for the post-war entail a new or unusual finishing problem . . . or an opportunity to profit from advanced, time-saving methods of application . . . our Research Division can help you with valuable suggestions *now*. Just as in the speedy conversion to war production, it helped many important suppliers of war goods get started . . . producing faster and better. Your inquiry will be held in confidence and entails no cost or obligation.

★ F-S ★

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hours to days, and it is considered unfortunate that the destiny of the many is governed by the requirements of a few, for a tougher and more durable primer could be used by those to whom speed of drying is not a prime factor.

It is hoped that in presenting the theory of performance of zinc chromate primers and something of their composition, I have been able to show that they are members of a complex family and that, like any other industrial finish, they can be tailor made to do the best kind of a job under a given set of conditions. Not all zinc chromate primers are fast drying. Some will not air dry at all. Those that require a bake may demand temperatures ranging from 150° to 300° F. or higher, and times from 15 minutes to two hours. Some will stand fabrication, others will not.

Colors may be yellow, green, red, gray, or most anything else. Some will work on steel but not on magnesium or aluminum. Moral: If your zinc chromate primer is not covered by a Government specification, outline your problem to your supplier of finishes and let him pick the one to do the best job.

In this article I have considered the theory and composition of zinc chromate primers. In next month's article I will get into the application of the material.

*(To be continued)*

## Black Finish on Copper

Blackening processes for copper, copper alloys, or copper-plated work are naturally favored according to their cost, as well as their efficacy under the particular requirements of a given product. Copper is ideal for the rapid transmission of heat, consequently it is often used where heat conditions are severe. One finish of this kind can be heated to a dull red without any flaking, and it can be continuously exposed to temperatures of 700°F., without harm. Essentially a cupric oxide coating, it is applied by immersion in a solution of blackening salts at 200° to 212°F. for two to ten minutes. A jet black finish that can be buffed, and that does not require lacquering to withstand wear, is obtained on copper, beryllium copper, bronze, phosphor bronze, and on brasses with a zinc content of 35% or less. The complete costs for work in baskets is claimed to run from 50 to 75 cents per 100-lbs.—L. B.

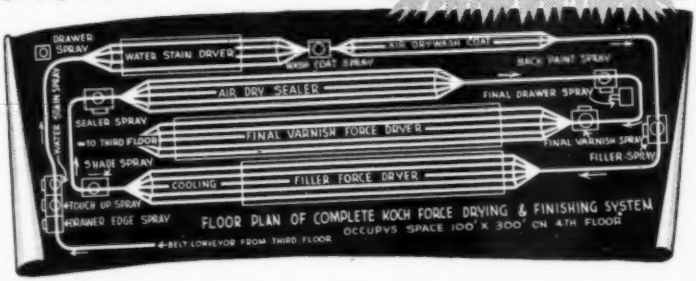
## G. A. Lux Joins Oakite's Technical Staff

In connection with its extension program to provide still further service to the metal-working industry, Oakite Products, Inc., New York, announces the appointment of Gerald A. Lux to its Technical Staff. He will make his headquarters in New York.

For two years a research associate of the American Electroplaters' Society at the National Bureau of Standards, and with many years' experience as a development engineer, chemist and research director in connection with metallurgical and chemical problems involving the use of alkaline and related cleaning compounds. Mr. Lux will devote a large part of his time to field work in an advisory capacity on special problems and developments. In addition, he will conduct research studies on metal surface preparation and finishes in Oakite's Research Laboratories in New York.

Gerald A. Lux, now a member of Oakite's Technical Staff, will do considerable field work, but will make his headquarters in New York City.

# PRODUCTION UP TO 900 UNITS A DAY!




## Another Example of How You Can Speed Up Production

## WITH KOCH FORCE DRYING and FINISHING EQUIPMENT

Designed for a nationally known maker of cedar chests . . . with a goal of 600 units a day . . . this KOCH Force Drying and Finishing System has produced up to 900 chests a day! The above diagram shows how the chests come up from the final assembly room . . are carried through 11 finishing and 5 drying operations continuously . . and then conveyed down to the rubbing and packing room ready for delivery.

The main air distribution and conditioning system for the dryers is installed in a penthouse on the roof. Accurate temperature and humidity control is maintained automatically regardless of outside weather conditions.

The success of this important installation is just further proof of KOCH's thorough understanding of wood finishing and drying problems. Let them make a study of your plant and product and recommend the equipment you need to step-up production!

*Five lanes of chests passing from the Filler Drying Unit ready for the next Spray coat.*

*Newly assembled chests receiving their first finish. Note the turntable section in the conveyor rack.*

*For Complete Information, Phone, Wire or Write Today.*

GEORGE KOCH SONS, INC.

Makers of

*Industrial Equipment*

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# Problem of Shrinkage on Wood Furniture

**Why a rubbed finish on new furniture sometimes loses its gloss, fullness and adhesion—and perhaps checks. Shrinkage, due to incomplete drying, is a common cause for this trouble.**

BY ROLLIN H. WAMPLER

SOMETIMES wood furniture manufacturers wonder why the finish on their products fails to look as good after storage for several months as it did when it was first rubbed and polished. The finish may exhibit some loss of gloss, fullness, and adhesion. In extreme cases checking or even cracking may appear.

Shrinkage is the most common cause of loss of fullness, but it is by no means the only one. There are at least four ways in which shrinkage may occur.

Perhaps the main cause of shrinkage is incomplete drying. Even a lacquer coating several days old still contains some of its solvents. A varnish film may not be completely oxidized and polymerized for a matter of weeks, even after force drying.

I once made a revealing drying test on a urea-alkyd furniture finish. A large wood panel was stained, filled, and sealed and cut into four sections. Each was given a coat of the urea finish and force-dried at 140°F. One was force-dried 45 minutes; one for one hour; one for two hours; and one for four hours. All were then rubbed and polished to a high luster. All were full and smooth and had an equally good appearance. But after two weeks the panels could easily be distinguished by their appearance. The film that had been force-dried for only 45 minutes had shrunk badly; while the one force-dried four hours had not shrunk perceptibly. The others were in between.

### Why Varnish Checked Only On the Top of Cases

In one case that comes to mind I investigated a case of varnish checking on furniture. The varnish checked on the tops of the cases, but not on the fronts and sides, on the day after application. Investigation disclosed that the varnish coat was too heavy. A single heavy coat had been applied in an attempt to cover surfaces that had not been properly sanded and filled. The finish was force-dried overnight in a hotbox at 100°F. The varnish was then perfectly smooth, but a little soft. The cases were then transferred to another floor where the temperature ranged from 30° to 40°F. In a few hours large, irregular checks appeared. The key to the problem was the observation that the most checking occurred on cases that were near windows and doors.

### Varnish Had Case-Hardened

The varnish had case-hardened, the surface being dry; but the re-

# WAR DRUMS

## 1944 STYLE

WAR DRUMS
1776 STYLE

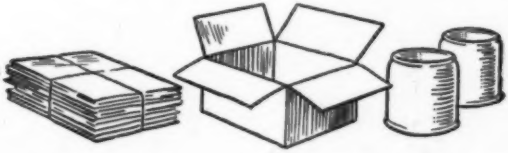
## Help keep them moving

War drums, indeed, are the drums that contain the protective coatings for America's war equipment.

Critical shortages of these drums, as well as

**CARTONS and PAILS**

makes it necessary that users of protective coatings return them as promptly as possible to the paint manufacturer...*Only in that way* can steady shipments of protective coatings be maintained.



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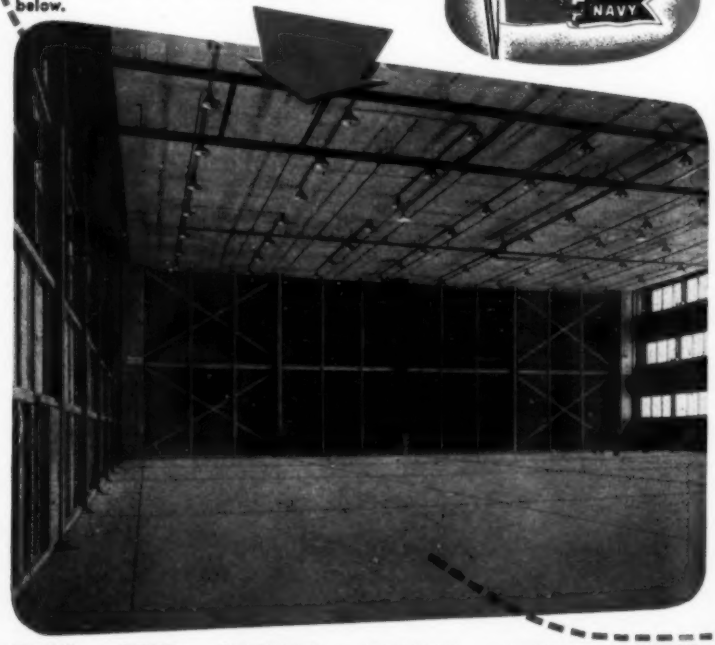
NEWARK SAN FRANCISCO CHICAGO

# MURPHY *Protective* COATINGS

# KEEPING UP WITH THE *Douglases*

## ANOTHER GIANT SPRAY BOOTH TO SPEED VICTORY

When engineers at the Douglas Aircraft Company, Inc., wanted a waterwash spray room large enough to house a completely assembled Douglas Army Transport Plane, Binks engineers designed and built the huge installation shown below.



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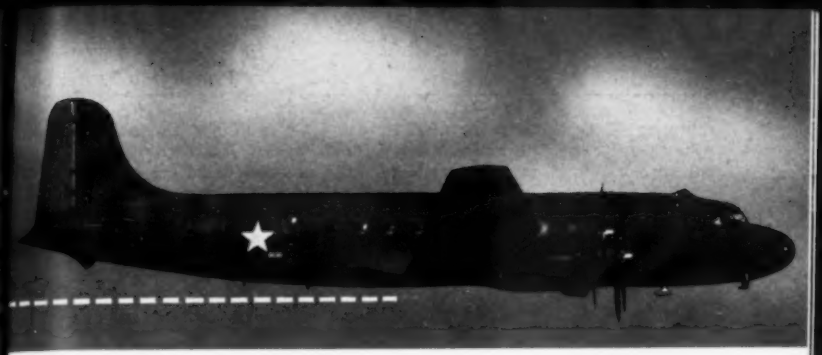

The men in the background of the photograph reproduced to the left give some idea of the size of a recent Binks installation at a Douglas Aircraft Company plant "somewhere in America." The doors shown on the sides of the room slide up to let great 4-motor Douglas Army Transport planes roll into the booth for painting.

This huge Dynaprecipitor Water Wash Spray Booth has a water curtain totaling 40 feet high and 100 feet long. Air from the room is drawn through this curtain. In this way paint fumes and atomized finishes are washed from the air before it is vented.

The chief satisfaction of designing and building spray painting equipment on this large scale is the knowledge that the work helps to speed the day of victory. Next to that is the valuable experience gained by Binks engineers and designers . . . experience that will make Binks postwar equipment and design services better than ever . . . not only on large installations but right down to the smallest accessory.

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mainder of the film was soft. In other words, the film had not dried through. When the cases were chilled, the difference in contraction of the surface and underneath portions produced the checks. The checks were not cracks in the film, but inverted wrinkles due to shrinkage.

Several solutions were found. One was to lighten the varnish coat and have the surface properly sanded and filled. The second was to use two light coats. Another was to operate the hotbox at 80°F. instead of 100°F. in cold weather. Lack of space and heating facilities did not permit further drying at ordinary room temperature, which was another solution. The solution finally adopted was to put a lighter coat on a properly prepared surface, with lower hotbox temperatures in cold weather.

### Most Shrinkage Caused by Improper Drying

Most shrinkage troubles can be traced to improper drying. Even though a finish may seem dry and rub nicely on the production line, incomplete drying may cause shrinkage later. Thin coats, with all the drying time possible before rubbing, is the best way to avoid trouble. Force-drying at 100° to 200°F. (160°F. is usually the upper practical limit) greatly speeds up the process and helps prevent shrinkage later. Properly set up conveyor schedules can go far to eliminate shrinkage; but schedules that do not permit proper drying after each operation can cause more shrinkage troubles than the slower air-drying schedules.

In another case, a furniture manufacturer applied two coats of lacquer the same day, air-dried overnight, and rubbed the next day. The finish shrank badly in two weeks. He discovered that if the lacquer dried 72 hours before rubbing the shrinkage was greatly reduced. What to do? He couldn't allow his lacquer to dry that long because he didn't have the space required.

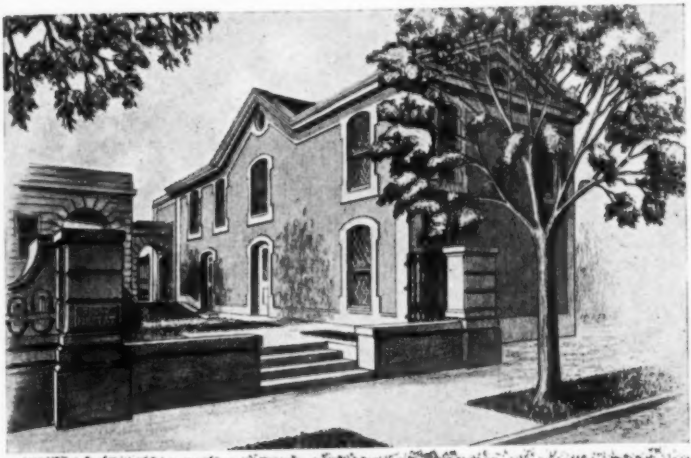
The problem was solved by installing a hotbox big enough to hold a day's production. He operated this hotbox overnight at 110°F., with proper humidity (about 35% relative humidity) and air circulation. The lacquer was then rubbed, and was found to retain its gloss and fullness to a high degree. The hotbox had simply removed the residual solvents which caused the shrinkage. In other words, *he had made the shrinkage occur before instead of after rubbing.*

A second cause of shrinkage comes from shrinkage of the wood base. Lumber may be properly kiln-dried before fabrication to, say 5% or 6% moisture content, and still pick up enough moisture in the veneer press and on humid days to cause shrinkage later. Veneer joints may open and pores may shrink, causing the finish to separate at the joints and "sink into" the pores.

The third cause of shrinkage is expansion and contraction of the wood from day to day, due to temperature and humidity changes. The best solution to this problem is to use finishing materials of sufficient elasticity and adhesion to withstand these changes.

### Sometimes It's the Drying Oils in the Finish

A fourth cause of shrinkage is absorption and evaporation of plasticizing materials in the film. In lacquers the use of plasticizers with extremely low vapor pressures and



BRING YOUR POSTWAR PRODUCTS HERE FOR *Evaluation*

If there is any question in your mind concerning your postwar product finishing plans, THIS LABORATORY, its product finishing experts, its complete and modern facilities and its six years of constant research on this important subject, will prove to be invaluable to you. It will help you to MAKE SURE your product has top sales appeal—an important factor in winning postwar markets.

*Billy Wrinkle Says:*

"Wrinkle Finish has helped many products to beat sales quotas. Write for a copy of 'NEW WRINKLES IN FINISHING' for typical instances."

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high molecular weight is the best practice. Most drying oils used in varnishes contain non-drying constituents which will not polymerize, staying in permanently liquid form. They may serve to plasticize the film; but migration later may cause shrinkage and embrittlement. This problem, only recently recognized, is being studied intensively today.

The critical shortage of drying oils has made necessary a more complete insight into their constitution and the mechanism of drying. It is not too much to expect that this study will bring into being drying oils and varnishes that shrink less in the drying and aging process. Thorough filling and sealing will reduce the tendency of permanently liquid film constituents to migrate into the wood, much as water is absorbed by raw wood.

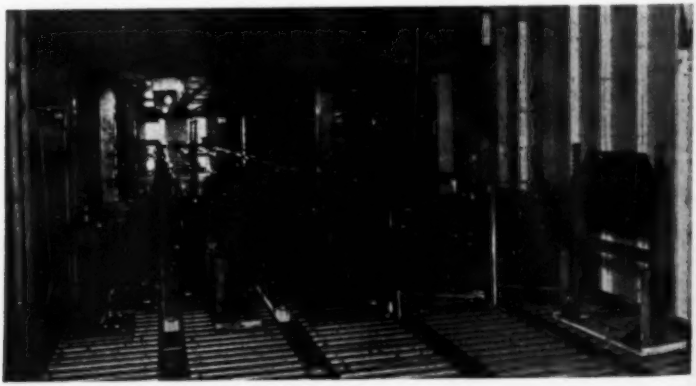
To summarize, proper technique to prevent shrinkage is to apply thin coats and allow as much drying as possible before rubbing. The wood should be properly sanded, filled, and sealed, and should be thoroughly dried. The finishing materials should be as tough, elastic, and adhesive as possible, even though extra rubbing and polishing are required to secure the necessary smoothness and gloss. Avoid short, brittle finishing materials, even though they dry quickly and rub easily.

It is recognized that the foregoing analysis of shrinkage is not complete in all details. In fact, there are many other angles to the problem. However, if the technique outlined here is universally followed, shrinkage will largely cease to be a problem.

## *American-Marietta Co. Buys Sewall Paint Co.*

The American-Marietta Co., Chicago, has purchased the Sewall Paint & Varnish Co., which has plants in Kansas City, Mo., and Dallas, Texas, as part of its expansion program that will include construction of new factories and improvement and enlargement of present facilities when restrictions are lifted.

This is the fifth company acquired by American-Marietta in the past 10 years, during which time its annual sales have increased from $1,200,000 to $12,000,000. The company now ranks among the first 10 paint manufacturing concerns in the country.



It is important to allow for adequate drying time on conveyor production line.

**SPECIALLY DEVELOPED to expedite the painting and baking of AIRCRAFT ENGINE CRANKCASES**

In this modern aircraft engine plant Mahon engineering has effected remarkable economies. By overhead conveyor, crankcases now flow continuously past painting positions and through the *automatically regulated 4-compartment* baking oven. Locating the oven ten feet above floor level saves valuable floor space. A specially developed ventilating system floods and exhausts from the paint room 70,000 cubic feet of heated, filtered air per minute, protecting operators' health and insuring faster, better work. . . . *Mahon engineers can modernize and economize YOUR finishing operations with equal efficiency and despatch.*

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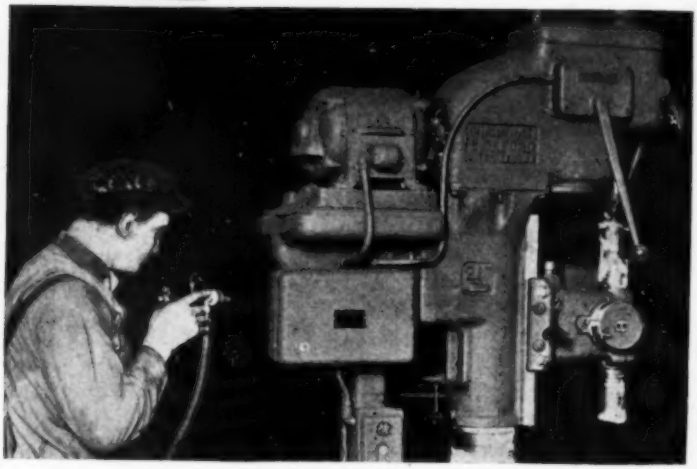
Manufacturers of Metal Cleaning Machines • Rust Proofing Machines • Hydro-Filter Spray Booths • Ovens of All Types • Filtered Air Supply Units • Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems

# HEAVY-DUTY BEAUTY!



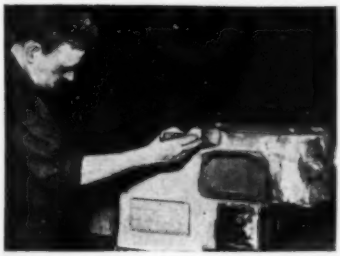
***"Pebbles" from a Spray Gun!*** *Handsome is the word for this Sherwin-Williams spatter-type Pebble-Finish! Dull texture reduces light reflection, makes scratches, grinding scars and other surface imperfections almost invisible. Thus, Cincinnati-Bickford* without using filler coats *puts a durable, good-looking finish on gray castings. Uniform and attractive, the Pebble Finish gives operators pride in their tools, helps speed production.*

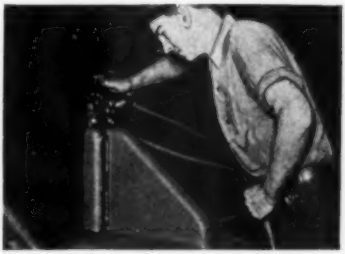
**SHERWIN-**

**1. Scratching the Surface!** *Rough grinding begins the finishing process by removing the worst surface flaws. But grinding itself leaves scars. These are the big "cover-up" jobs for the finishing coats.*

**2. Plenty of Primer!** *Remember, these castings won't get filler coats. Primer coat used by Cincinnati-Bickford is supplied by Sherwin-Williams.*

**3. Flattering Finish!** *Sherwin-Williams Pebble Finish carries greatest burden of the finishing job. Sprayed on for speed, its rough texture hides surface scars.*





## SHERWIN-WILLIAMS helps Cincinnati-Bickford short-cut drill finishing without sacrifice of lasting beauty!

YEARS ago, Cincinnati-Bickford proved the theory that attractive, easy-to-clean finishes on machine tools contribute to speedy, efficient operation. When government restrictions hit industrial finishing, this firm was reluctant to abandon the "heavy-duty beauty" for which they were famous. Instead, they called Sherwin-Williams paint engineers into consultation.

Today, the Pebble Finish—recommended by Sherwin-Williams for use on Cincinnati-Bickford Drill Presses—fits well within government limitations—yet is as good-looking, as durable as the prewar finish! Present finishing system saves over two-thirds on materials, manpower, finishing time. Now, two coats do the work of four. Filler coats are eliminated completely, drying time reduced, the entire finishing process speeded.

This success story is typical of the way Sherwin-Williams helps industry. Often a wartime shortage can be turned to permanent advantage. Our cooperation is available to you, too. The Sherwin-Williams Co., Cleveland 1, O.

**WILLIAMS INDUSTRIAL FINISHES**

# WHAT THE WAR HAS TAUGHT US
# *About Finish Cost*

**The front office has finally become finish conscious, realizing that "price per gallon" is not the yardstick to use when measuring the real value of a material, or the thinner for it.**

**BY ADAM W. TRITSCH**
**Thompson & Company**

IF THE WAR has done nothing more to help the paint, lacquer and varnish industry than to make people in the front office finish conscious, then it has done something that material salesmen were not able to do previously. Prior to the war, many a paint engineer was able to show plant management a material, a set-up for application, and a finish that cost more money per gallon, but less per product; yet the front office presented that almost universal opposition: "Price too high; the plant will use what we buy; reciprocity," etc.

### How Finish Salesmen Got the "Run Around"

This was mostly because the front office did not seem to want to know much about finishing materials, except to buy them. When you tried to explain, they would say, "It's up to the plant." But when you did get to the plant you often were told that they would like to use the material and could save money in labor, time, etc., but the front office only saw one thing, namely, "the cost per gallon."

Also, the front office would often buy thinner at cheaper prices to reduce their material, and let this ride for some time, until a breakdown occurred in the finishing department. Then they would cry to the skies about the material being all wrong. To straighten them out required costly trips by the paint engineer, and perhaps additional technical laboratory time and expense. Then they would only apologize by saying: "We didn't think that changing a thinner would make any difference, because the source selling the thinner told us that it would give satisfactory results, and that we could save 8 cents or more a gallon, or $4.00 or more a drum."

War production demands results, and the shopman with lack of labor (and much of it unskilled) and with the time element important, now gets the best materials available. The front office is frowning on the small profits, yet they know that it's not because the material for finishing an article, or the labor to apply it, is costly. They know that the finishing cost is the smallest cost of most any production job.

### When Used Properly, the Finish Is Smallest Cost

I marvel at the small cost involved in finishing any item made for the war industry on a production line—that is, in comparison with the cost to manufacture the item. Only a few weeks ago, to get an operation started, I helped dip some lugs and had estimated

# HAMMERED METAL FINISH

## Another Problem-Solver by

ZAPON

Reg. U. S. Pat. Off.

Zapon is proud to announce that materials are again becoming available to produce the finish that gives this unique hammered metal effect.

This finish covers surface imperfections and gives a good looking wear-resistant coating proven satisfactory in pre-war production.

Zapon Hammered Metal Finish is normally baked but an air-dry modification can be provided for specific requirements.

Let the Zapon representative show you sample panels—*now*—and explain the system of application that will best fit your needs.

**ZAPON DIVISION** ATLAS POWDER COMPANY

Eastern Sales: Stamford, Conn. Western Sales: No. Chicago, Ill.

**INDUSTRIAL FINISHES** ... *For Your Products of Tomorrow*

the number that one gallon of material would cover, plus the application cost by hand. Then, when the conveyor is set up, I figured how this would be reduced. The unit cost was so small I just could not get my decimals in the right place to make it look logical.

I feel prompted to again emphasize the importance of cleaning, so that a proper surface is presented for the finish to do its job. More of this must be done, and a better understanding of a clean surface is necessary. The type of cleaning compound used, likewise the equipment and methods, must be made known to the finish material man, so he can give the answer to many finishing problems.

Consider the oils and compounds used for drawing and machining products, and the quantity of this material used, and its cost. It amounts to many times the cost of the finish, yet it is recognized by management as a necessary item—although it doesn't show on the finished product.

**Finish Salesmen Welcome; No Samples Unless . . .**

Today the front office almost welcomes the finishing material man and makes it easy for him to see the man who must do the job, so that man, who is responsible for results, can be helped directly instead of by remote control. I am sure this trend will continue after the war. At any rate I hope so. It is certainly a good thing.

Also, I do not think any finishing material manufacturer should allow his representatives to exploit samples, as was done a few years ago. First, a survey of all information needed should be demanded, or the account should be passed. Otherwise your samples may do more harm than good.

It is my opinion that a finish on any product is just as important as that product's design, and I believe that designing engineers should know more about finishes.

In layouts for the application of finishes, it is true that plant engineers and maintenance engineers know their own problems, but they could save much money and labor and later trouble if they would take counsel with the finish engineer or serviceman.

In some instances I think that the paint, varnish and lacquer industry is its own worst enemy, in that so often it lacks the vision or courage to say "No," when an unreasonable demand is made or asked. A finish user asks for a finish to do a certain thing. It may be unreasonable or impracticable, if not impossible. In most cases the representative will say, "Yes." He does it because he hasn't the courage to say "No." You and I can correct these faults. The war has opened our eyes to them.

I wonder how many men in the front office read INDUSTRIAL FINISHING or similar publications. They are fountains of information. The man in the shop reads them. To get value from anything, you must use it.

---

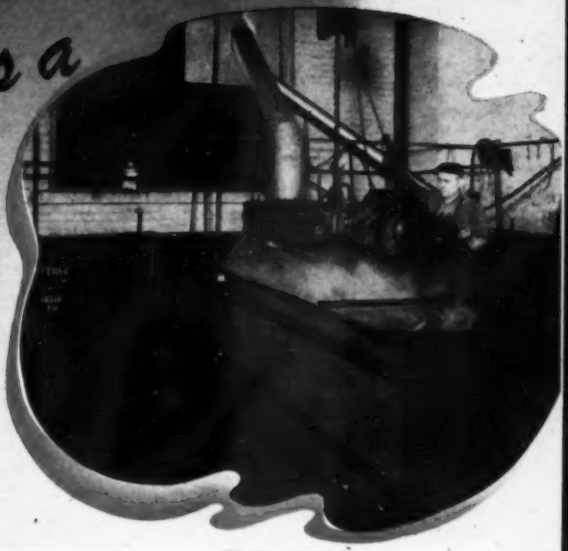
## *Conway Joins Udylite Corp.*

Bernard J. Conway, for 12 years connected with the Proctor Electric Co., Philadelphia, has recently become a member of the engineering and service staff of the Udylite Corp.'s New York Office.

Mr. Conway's experience as manager of the buffing and polishing division and later as head of all metal finishing operations at the Proctor Co., especially qualifies him for his new work.

He will be in charge of the territory comprised of all southeastern Pennsylvania and southern New Jersey. His headquarters will be Philadelphia, where he has many friends in the metal finishing industry.

# Is Yours a HEAVY DUTY Cleaning Job?



One of many "heavy duty" applications for Triad Cleaners.

**A Few of Many Applications of TRIAD HEAVY DUTY CLEANERS**

- Removing quench oil after heat treat
- Soak tank cleaning before cadmium or zinc plating.
- Steam cleaning for production or maintenance.
- Stripping of air-dried or baked finishes.
- Cleaning metal stampings or castings before painting or further processing.

**In hundreds of different "tough" cleaning applications, caked-on dirt, heavy oils, grease and drawing compounds are thoroughly removed by Triad Heavy Duty Cleaners.**

**Speed and efficiency are assured with the grade of Triad suited to your particular cleaning operations.**

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# How to Get More Out of Your Equipment

BY W. BEACHAM

A MANUFACTURER, when thinking of speeding up production in his finishing department, usually thinks of automatic spray equipment (which generally is right) but too often never bothers his head about the care of that equipment. The word "automatic," to so many buyers, means "turn the darn thing on and it will run itself."

Mr. Manufacturer, do you realize that thoughts of this nature retard confidence and progress in the automatic finishing field? You, Mr. Reader, may reply: "But I am not like that, I take care of my equipment."

I have heard so many executives assure me about how careful they are with their paint equipment; but when they take me into the finishing room I find the conveyor loaded with dry paint, and sludge causing a poor water curtain at the water-wash spray booth, and a dozen other things wrong. Mr. Manufacturer, hasn't the time come to stop operations long enough to permit some careful inspection and cleaning up?

Of course, with hand spraying, the spray guns and material tanks are cleaned at the end of the shift and the operator goes home to rest. (That is, it is this way in well-regulated establishments.) But, as soon as equipment is bought to do maybe 50 times as much work with less help, it is supposed to run "without rest, food, or a wash and shave". If the human operator needs rest and a clean-up, why shouldn't the automatic equipment need a little care too?

**Instruct New Help on How to Use Equipment Properly**

Another little headache I run into is the continuous change of help. After several hours of breaking in new help, and in some cases several days, I leave the plant feeling free in mind, knowing the automatic equipment is running fine, is in good hands and will be well taken care of. A few weeks later the spray guns are reported out of order. Of course, I know there has been a change of help. Mr. Manufacturer was too busy to learn all about the equipment that he bought (and, it cost plenty of money) and when he changed help he didn't see to it that the new employees were properly instructed on how to take care of this high priced automatic equipment. Eventually it gets out of order due to lack of cleaning or improper adjustment or abuse of some kind, and then it doesn't perform properly. Then he blames the trouble on the spray equipment and calls in the manufacturer's representative.

Gentlemen, you have been doing such a wonderful job increasing production, why not go just a little further and understand your

*(To page 59)*

MOST IMPORTANT among the ingredients which comprise any Reliance finish are the experience, imagination and resourcefulness of the men who create it. These ingredients carry no priority number—rare and priceless as they are.

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Reliance customers, of course, know these things and have seen them operate to their advantage and profit. We are anxious for an opportunity to help you too!

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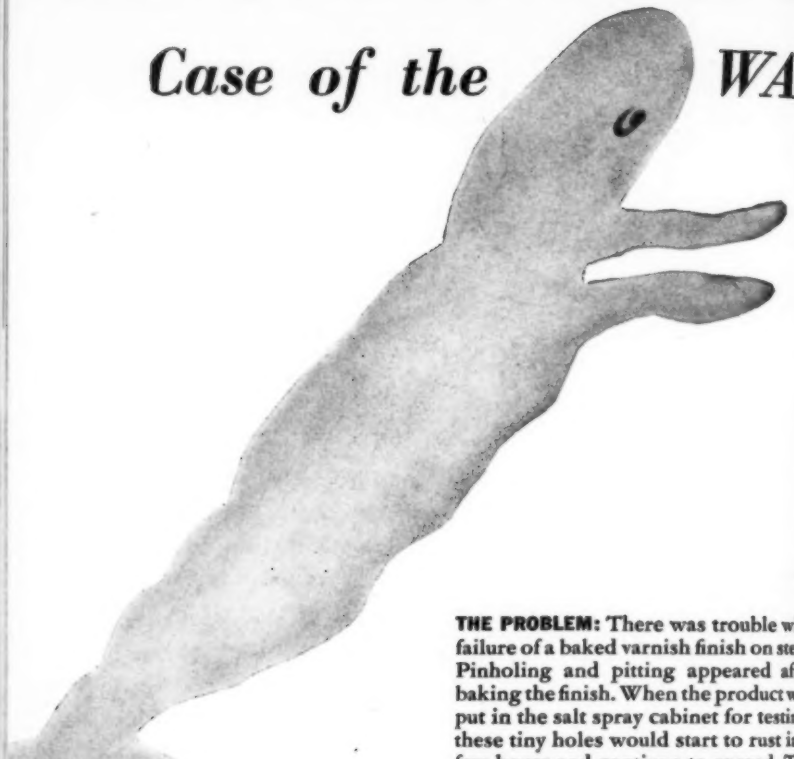
**"RELY ON RELIANCE"**

# *Case of the* WAN



**THE PROBLEM:** There was trouble with failure of a baked varnish finish on steel. Pinholing and pitting appeared after baking the finish. When the product was put in the salt spray cabinet for testing, these tiny holes would start to rust in a few hours and continue to spread. The manufacturer was puzzled. He simply couldn't find an answer to the problem, so there was only one thing left to do.

## WRITE OR WIRE THE DU PONT WAR SERVICE MEN

☐ *How to speed output and save materials*

Handy pocket-size, fully illustrated booklet, *"Hints on Wartime Finishing Economies."* Shows you 11 points to check for greater efficiency and speed on your war contract finishing schedules.

☐ *How to meet emerge and solve problems*

Check here for the help of Du War Service Men—skilled "tro shooters" to straighten out "ki in your finishing system *befo after* the trouble occurs. T "know how" is at your dispos any war contract finishing. W about your trouble. Or wir case of emergency.

# WANDERING WAX FUMES

## How a Du Pont War Service Man Solved a Pinholing and Rust Problem

**S.O.S. GOES TO A DU PONT MAN:** After a short, intensive survey, the Du Pont man found the source of the trouble. An automatic waxer, which applied a coat of wax over the baked varnish, was located just a short distance from the varnish spray machine. The Du Pont man saw that fumes from the waxer were being pulled across the face of the spray booth. Some of them were coming in contact with the steel surface *before* the varnish was applied.

**ANSWER TO THE PROBLEM:** The solution lay in keeping away the *stray* wax fumes that were responsible for the failure of the varnish. How? "Increase the exhaust of the waxer," recommended the Du Pont man, and the trouble disappeared.

When a Du Pont man is called in like this, he brings to bear on the problem all of his Du Pont training and years of experience in analysis of finishing problems.

There's a Du Pont man near you who will be glad to consult with you on your finishing problems.

Write E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Wilmington 98, Delaware.

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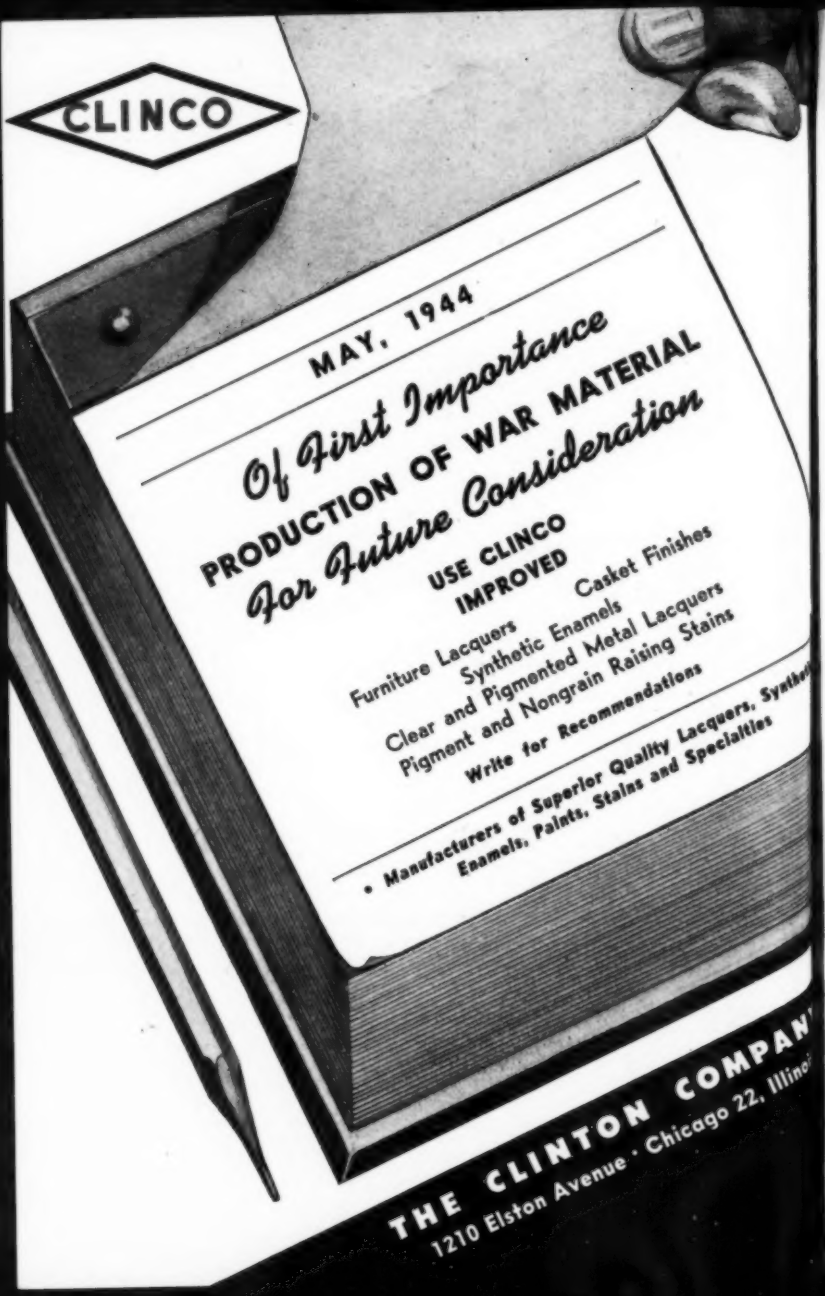
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equipment? If you are able to break in new help and teach them the care of expensive equipment, the equipment manufacturer can improve his products. What I mean by this is that, at present, automatic spray equipment must be built so that a 5-year-old child can take care of it, which limits its field to simple operations. If the buyer will learn how to properly operate and care for his purchased equipment and insist upon his help doing this work properly, the equipment manufacturer will have less to worry about and more time to improve the present automatic sprayers.

### A Few Suggestions About Care of Spray Equipment

To prove that you are as proud of your equipment as the organization that designed it, built it, sold it and installed it, I would like to suggest that you keep your water-wash system clean. Drain the tank once a week; clean off the sludge from the top of the water every four hours; flush out the manifolds; keep the conveyor clean and well lubricated; also keep a thin coat of oil on the workholders of the conveyor (except where they touch the work) as this will help keep them clean (or make them easier to clean) and save hours of maintenance work.

Pressure tanks should be cleaned at least once a week, and solvent should be blown through the guns to prevent caking and separation of material in the hose.

When you refill your pressure tanks, strain all paint, even clear lacquer and varnish, through a 150 to 200 mesh metal screen. Do not use cheesecloth, as particles of dirt and material skin work through cheesecloth, and particles of lint are also carried into the paint from the cloth. These particles of lint will, in time, work up to the nozzle of the spray gun and "throw the spray off"—and we can't afford rejects.

Clean the nozzle of the spray gun from time to time with a little solvent; and oil the spray gun plunger. A clean, easy working spray gun is always most desirable.

### An Example of What Manufacturers Are Up Against

Of course, the foregoing suggestions and recommendations are all too obvious to trained finishing men, but I would say that at least 80% of the people in finishing rooms today are not well trained. Here is an example I bumped into a few weeks ago, in a very large plant in the South. The foreman was a preacher and all of the help, except one, were cotton pickers. The odd one had driven a truck for a paint company, so he was put in charge of the mixing room, having handled paint in the past. (I mean no disrespect to preachers or cotton pickers; they are essential in their place. Probably most of our well informed finishers would be out of place preaching or picking cotton.)

Upon explaining the care and handling of spray equipment, the help promptly told me: "That doesn't interest us. We were hired to watch the automatic sprayer and that's what we are going to do—watch it."

I am glad to say there are not many plants like that. The majority want to do all they can in cooperating with their suppliers of equipment and materials. The most severe problem is lack of time for the engineers, superintendent or manager to really un-

derstand that even a piece of machinery can, if not given the proper attention, become as temperamental as a movie star.

### Water-Wash Booth That Doesn't Need Compound

I mentioned water-wash spray booths previously in this article, but I want to go back to them. Have you tried operating without water-wash compound in your tanks? You will find the sludge or overspray will float on top of the water—that is the majority of paints—without the added expense of charging your tanks with compound.

Recently I examined a new type of water-wash spray booth designed to do away with water-wash compound. All that is needed in this new booth is to fill it with water and start operating. Of course, the sludge needs removing every four hours. Then, at the end of the week, the tank should be emptied. In the demonstration I witnessed, the tank had not been emptied for three months.

### Thorough and Regular Cleaning is Desirable

However, recommended practice is for the tank to be emptied at the end of each week and given its usual cleaning. Then it is half filled with water to which a small can of cleaner is added, and the booth is operated for half an hour to clean out the manifolds. The tank is then emptied and refilled with clean water, and the booth is ready for another week's work.

In localities where the water is extremely "hard," I believe a little water softener would help. The beauty of this "plain-water" booth is that you use no strong acids or alkalies which might possibly damage parts of the booth or spoil the sludge for reclaiming.

## Cleaning Metal for Product Painting

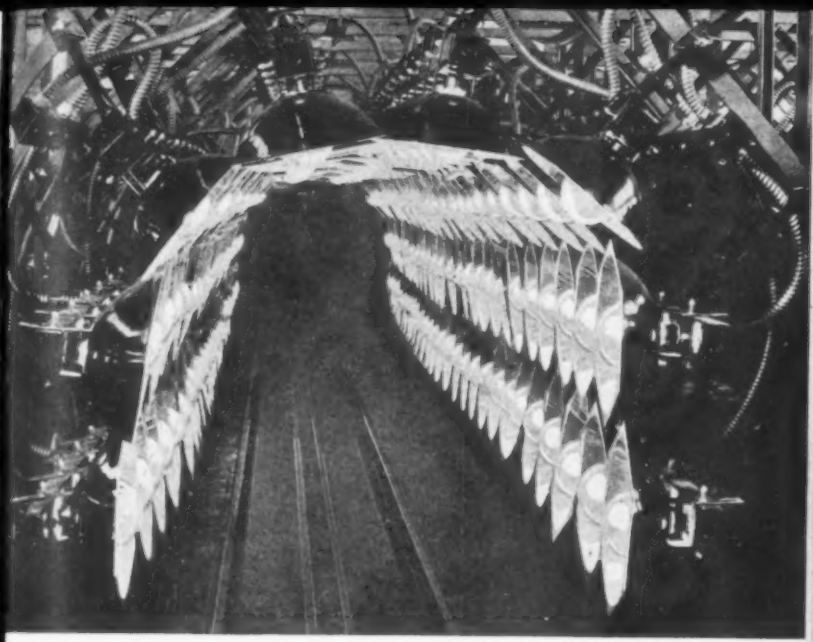
A CLEAN metal surface is a surface freed of all invisible, as well as visible, contaminants. Only chemically clean surfaces will retain a satisfactory protective coating of paint or lacquer indefinitely.

The metal-products industries, after many years in research endeavoring to prevent premature failure of paint on metal surfaces, found the chief cause of failure to be improper cleaning in preparation for paint. Serious difficulties are being experienced today with protective finishes for war materials which must be protected to withstand all kinds of climatic conditions.

Proper cleaning is more than the removal of visible rust, scale and oxides, or even the microscopic particles remaining in the surface pits; the rust producers and other invisible contaminants must be removed or so changed that they will not develop under the applied finish.

It is unsafe to judge the condition of the cleaned surface by its uniformity and apparent "cleanness" which often have been the criteria by which contractors and inspectors have judged the merits of the cleaning cycle. Many materials will give a clean and uniform-looking surface to metal, which has been freed of visible impurities, yet will leave it highly unsafe to paint. Addition to the rinse water of alkaline materials will generally do just this.

Among the alkaline materials that are added to rinse baths are caustic soda, soda ash, sodium chromate, mixtures of sodium chromate and sodium bicarbonate. If the metal has been cleansed by an



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**IQUID PLASTICS DIVISION**

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alkali process and then rinsed in an untreated water bath, there is bound to be an alkali accumulation retained which will be harmful to organic coating life.

The suitability of a surface to take and hold a protective coating cannot be assumed from the appearance of the metal surface. The invisible impurities are often as harmful as the visible ones. These impurities, carried into the rinse from the cleaning bath, include alkalies and alkaline salts (always present in the water), salts of iron (such as the chlorides and sulphates which remain from pickling operations) and soluble material, such as soap, sulphated or sulphonated wetting or emulsifying agents, etc.

The use of a phosphoric-acid type of cleaner, containing grease solvents, wetting agents, and sometimes inhibitors of acid attack on steel, affords a method of visible impurities which leaves the least amount of invisible harmful residues. Traces of phosphoric acid, left behind, are not harmful to paint life.—*American Chemical Paint Co.*

## Painting Welded Joints

The preparation of welded structures for painting or finishing was formerly a much more difficult job. Arc-welding spatter fastened itself over the surfaces of the structure adjacent to the weld, in the form of "berries" of metal; these "berries" had strong adhesion in many cases and were difficult to remove. Now, this trouble is headed off by the use of a spatter-proofing liquid that can be applied by brush or by spray, along the edges of metal parts to be welded. Not only does it prevent adherence of the spatter, as made by some firms, but it conducts electricity and helps to prevent the arc from breaking, and in addition, aids in removing impurities in the welding operation. To prepare the surface for painting, it is simply wiped off.—E. N.

The War Production Board states that shipments of magnesium fabricated products doubled in 1943 as compared with 1942. This increase reflects the rising demands of the aircraft program for the light metal, where over 90% of the fabricated magnesium is used. Although data on incendiary bomb castings were not revealed, it may be said that shipments of this single type of permanent mold casting exceed shipments of all other kinds of fabricated magnesium combined.

## Standard Varnish Appoints C. R. W. Thomas

The Standard Varnish Works, Staten Island, N. Y., announces the appointment of C. R. W. Thomas to its technical staff of sales and service engineers.

Mr. Thomas holds the degrees of M.A. and Ph.D. from the University of Pennsylvania. He was formerly Associate Professor at the U. S. Naval Academy in Annapolis, and Associate Editor of U. S. Naval Institute Proceedings. He has also had many years experience directly in the protective coating industry. Mr. Thomas will be in charge of sales and service activities for Standard Varnish Works in the Baltimore territory.

C. R. Thomas will be in charge of Sales and Service activities in the Baltimore area.

# JOHNSON'S WAX-O-NAMEL

## for Household Heating Equipment

Household heating equipment must have a finish *both* beautiful and durable—for "eye" sales appeal and for rugged service. That's why many of tomorrow's stokers, oil and gas burners, heaters, radiators, etc., will be finished with Johnson's Wax-O-Namel.

Because it contains wax, Johnson's Wax-O-Namel provides an attractive appearance *plus* long-lasting protection. Wax-O-Namel gives a hard, uniform finish that resists scuffs and scratches, and makes surfaces easier to clean. Wax-O-Namel can be baked in conventional ovens or infra-red curing banks. It can be applied by spray or dip methods.

Why don't you investigate Johnson's Wax-O-Namel now, and find out if it can help solve *your* finishing problems. Write for the full facts.

***TODAY*** Wax-O-Namel provides extra protection for war equipment.

***TOMORROW*** Wax-O-Namel will provide extra protection and new beauty for peacetime equipment.

***Let's ALL back the attack—***
***buy ANOTHER War Bond!***

S. C. JOHNSON & SON, INC.
PRODUCT FINISHES DIVISION
Department IF-54
Racine, Wis.

# Recovery of Waste Finish Materials

BY HERBERT H. WATJEN*

IN MOST production methods of applying coating materials, some waste is involved. In some cases, not only are the solvents lost but the complete finishing material. Obviously, any process that can minimize this waste is especially important today when raw materials are limited in quantity. However, because of the economy involved, these processes would be welcome in the postwar period, when radically new methods will probably be instituted, revolutionizing many industries.

In the production of civilian goods after the war the utilization of methods, which have been successfully applied on war products, is probable because of this economy. This article is merely presented as a brief general outline of some of the techniques that can be used to minimize the waste of finishes; and some of the recovery systems that regain the solvents and solids which otherwise would be lost.

### Solvents are Lost Unless Recovery System is Used

On all methods of application commonly employed, solvents are lost unless a solvent recovery system is employed. In the case of furniture finishing materials, for example, the percentage of solids in finishes, as used, may vary from 45% for the varnishes to 20% for some lacquers, and to as low as 4% or 5% for other lacquers, sealers, and washcoats. The remaining 55%, 80% or 95% consists of solvents which normally disappear through the exhaust system. In small operations, this loss is negligible but when the quantity of finishes used annually is considered, the value of these lost solvents approaches an astronomical figure.

Some of these solvents can be recovered by collecting their vapors in a suitable type of a hood and passing them through a water-cooled condenser from which the liquid solvents can be collected. The percentage of solvents recovered will depend on the particular solvents involved, the percentage of solvent vapors in the air, the temperature of the condenser, the efficiency of the condenser system and its design. The cost of an efficient recovery system can be repaid in a short time—in many cases by the saving in solvents required by the concern. In small scale operations, the installation of such a condenser system would hardly be economical.

### Paint Losses Occur in All Systems of Application

When the spray method of coating is used, part of the finishing material is completely wasted, especially when intricate objects are

*Chief Chemist at furniture plant.

# *Power for Invasion*

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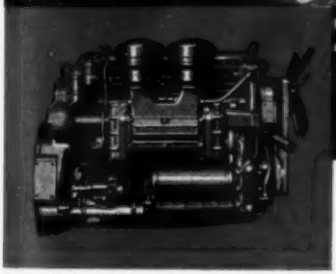
BROTHERS



Speeded-up invasion plans meant speeded-up painting schedules on thousands of Diesel engines for invasion craft! ¶ The problem . . . a very critical one . . . was to get more production through the same finishing department. The answer was Berry Brothers' No. 21 Zinc Chromate Primer and Berry Brothers' Ocean Gray Gloss Lacquer. *Berry Brothers' Zinc Chromate Primer air-dries in 5 to 10 minutes, to re-coat with lacquer or synthetic. Lacquer dries at once, to handle and crate! No. 21 Zinc Chromate Primer is rust-inhibiting; lacquer is oil and chemical-resistant! Result . . . not only a fast job but a good job!* ¶ What is your wartime painting problem? Are slow, hard-to-handle materials "invading" your finishing department . . . gumming up production schedules . . . eating into profits? It's quite likely we can help you. We'll gladly study your needs and make recommendations if you write.

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coated. In these cases some of the spray merely passes out through the exhaust fan. Even on simple objects which are sprayed, there is a considerable loss of coating material. In some cases, this waste solid material can be recovered from the walls of the spray booth and reused in a lower quality finish. Water sprays are also used to collect spray vapors and droplets as they are drawn out of the spray booth by fans. The solids can be recovered from the collected water by separation methods.

However in spraying, the greatest economy can probably be obtained by teaching correct methods to those actually doing the spraying. This is the foreman's responsibility, and it is exceedingly important today when so many new and inexperienced men and women are using spray guns. A poor technique of spraying can waste much more material than is actually applied.

Complete finishing materials — i.e., solvents and solids—are also lost in dip-coating, flow coating, and tumbling because the drippings of the excess materials are not efficiently collected. The strategic location and design of drainboards can do much to minimize waste from this technique of coating.

An economical method of coating in so far as producing a minimum of waste is concerned, is roller coating. (Of course, roller-coating is limited to the coating of flat panels or flat sheets or flat ribbons of stock.) No excess material is applied . . . only enough material to produce the desired thickness coating is applied to the flat work from the rollers. The result is a reasonably accurate regulation of film thickness.

When the roller coating machine is cleaned for a change of material or color, and before any period of inactivity, such as at the end of the day's work, some material that clings to its rollers and other surfaces will be wasted by washing and wiping those surfaces clean.

Naturally there are some limitations as to the adaptability of the roller coating method of applying finishing material. Very thin coatings are difficult to apply, in some cases, and application is practically limited to flat stock of uniform thickness. Great success has been obtained for years on cloth, papers, thermoplastic transparent sheets, metal foils, smooth veneers and plywood, in addition to many other materials.

With the advent of new types of finishes, various other methods, and special modifications designed to handle these new finishes, will be initiated. Some such modifications will be necessary in order to utilize certain new finishing materials being developed now.

But regardless of how the coating is applied, a great saving can be obtained by recovering solvents which otherwise would be lost. Drying methods involving heat will ease the collection of these solvents. The use of hot air, steam coils and, to a greater extent, infra-red lamps and high frequency electro-static heat will probably be applied subsequently to all these methods of coating in some sort of a drying tunnel or chamber.

This brief survey and outline demonstrates and serves as an illustration of how the reconversion of equipment, materials and methods used on products of war, can carry over many improved and economical methods of application including waste recovery systems, when the production of civilian goods gets under way again.

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**PITTSBURGH** *Industrial* **FINISHES**

# Finishing Fiberboard Panels

BY E. C. ELDON

**Grained fiberboard panels, now used through necessity, may be preferred later when fine hardwood ply panels are available to furniture plants.**

AS A RESULT of numerous material shortages caused by the war, many alternates and substitutes had to be found—and the use of some of these different materials has necessitated changes in production methods. Old established materials and methods, which never were questioned before the war, have had to be replaced by various available substitutes. One of the changes I have in mind is the substitution of Masonite, gypsum board, or some similar pressed fiberboard—for plywood panels, in the manufacture of furniture and certain appliances.

The practice of reproducing wood graining on this type of panel has become more extensive during the past year and I believe it will probably outlast many innovations brought about by the war.

Some characteristics of the available composition boards make them really more desirable than ordinary plywood. For example, the panels from any particular brand of fiberboard are uniform in texture, desnity, weight and smoothness; they are readily workable with woodworking tools; and they do not swell, shrink or warp to any appreciable extent.

Composition board or fiberboard can usually be purchased (in quantities) in cut-to-length and width sizes; or it can be purchased in large sheets or panels which can be cut to the desired sizes with ordinary woodworking trim saws. The surfaces of hard, pressed fiberboard are usually so smooth that no sanding is needed. And what is equally important to finishers and factory executives, no surface fibers raise (as in the case with wood) when preliminary finish coats are applied, therefore no sizing or wash-coating and the usual follow-up sanding are required.

### No Shading or Bleaching; No Filling Needed

The single uniform color of these fiberboard panels serves also to eliminate the need of any shading, bleaching or uniforming treatment, which is so often necessary where unevenly colored and sap-stained wood panels are used. Also, no filling is needed.

The initial cost of satisfactory fiberboard panels is considerably

# Protective Coverings

It's a smart girl who applies a good sunburn lotion before risking her skin to the ravages of sun and water . . . and our government used the same kind of foresight when they specified the types of protective coatings that were to be used on our war products.

The finish of a product *has* to be good when it must do its job in all corners of the world and under all sorts of climatic conditions. Our wartime protective coatings meet all U. S. Government specifications . . . just as our civilian finishes meet the requirements of discerning companies everywhere.

*Your inquiry will receive our prompt attention.*

*No Tampering with Quality*

ROCKFORD VARNISH *Company*
ROCKFORD, ILLINOIS

*Manufacturers of Protective and Decorative Coatings*

lower than ordinary plywood panels suitable for furniture construction. A substantially large saving appears when the fiberboard replaces an expensive plywood such as walnut or mahogany. Here the savings can well amount to as much or more than 10 cents per square foot.

**Apply Ground Coat**

Let us assume that you plan to grain the panels. First, you apply a ground coat of suitable color and uniform thickness. This can be applied by automatic power spraying, power roller coating or hand spraying. Either this ground coat or a thin coat under it must be of such character as to produce perfect and lasting adhesion to the smooth hard surface of the fiberboard.

After the ground coat is thoroughly dry, it may need to be lightly sanded with fine sandpaper to keep the surface perfectly smooth.

**Different Methods of Graining**

Several different methods of graining—that is, printing the reproduction of wood grain on the ground coat — are in practical use. These include: 1) hand graining; 2) printing with a composition roller which picks up the pattern from an etched copper plate that has been properly inked; 3) printing from an inked roller that has the pattern of wood grain etched or cut directly on its surface; 4) screen stenciling; 5) decals; 6) grained lacquer or synthetic film.

Hand graining with brushes and graining tools is practically out of the question unless you happen to have, or can easily get, a rapid skillful hand grainer who is dependable. Even then, some form of mechanical graining is usually more economical on flat work that is or can be grained before assembly.

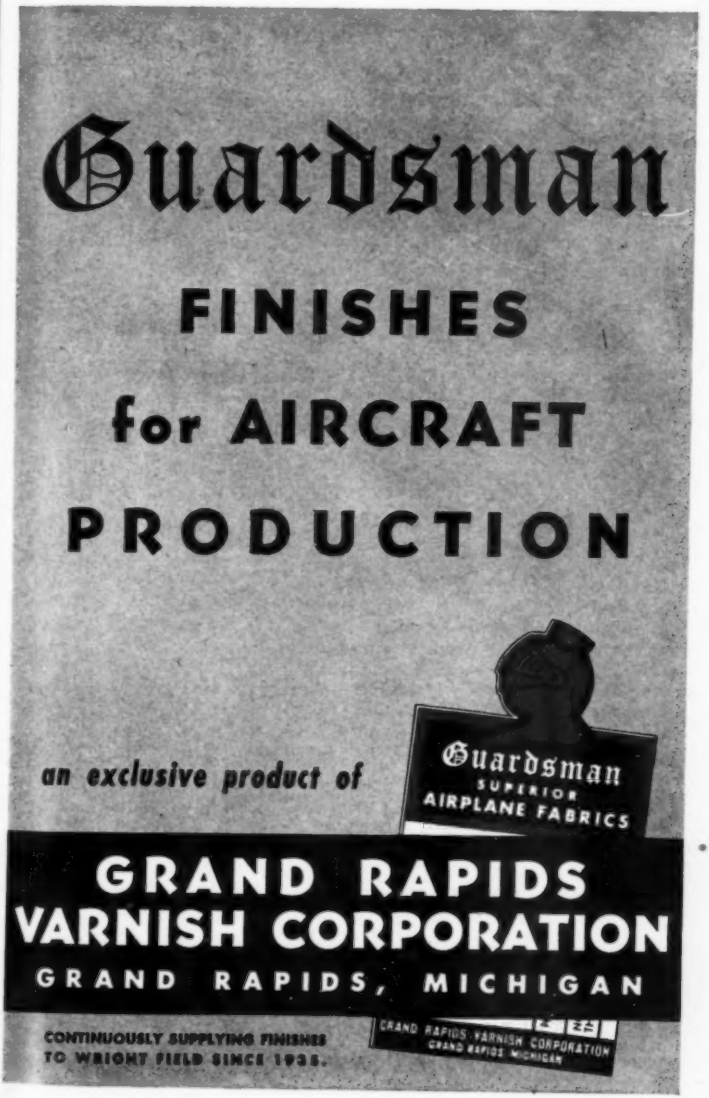
Grain reproduction by the use of a large "pick-up" roller which picks up the inked pattern from an etched copper plate and rolls it onto the panel, is a dependable process that has been used extensively in a number of factories for many years. Whether you can buy new equipment for this process during the war, I am not sure. Probably no new copper plates can be made because copper is a critical material for the duration. Used equipment might be found for sale or lease somewhere.

The screen stencil method of grain reproduction is simple and fast, once the equipment is prepared and in operation. Several concerns can furnish the equipment partially or entirely made up for this work, along with instructions for carrying on. This screen stencil equipment doesn't cost as much as the etched copper plate, rollers and accessories. This method of graining can be easily learned and performed by women.

Decals and prepared lacquer or synthetic films for graining can be purchased complete, along with instructions for applying same. Clear detailed instructions for using either of these simple easy methods would make an article in itself, so I will not go into it here.

**After Graining—**
**A Clear Top Coat**

After the panels have been grained, and when the graining ink is dry, they are generally given a clear or slightly tinted transparent protective coating. This can be the same top coat finish that is used on the frame work or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other woodwork that adjoins the panels in the assembled piece of furniture.

I believe that grained panels made of composition or fiberboard (there are several brands, including Masonite) will be more extensively used as time goes on, because the cost of production and finishing these panels will be lowered, whereas plywood panels, faced with genuine hardwood veneers, will probably become more expensive.

## Sealing Metal Joints

Metals are extruded both hot and cold, the latter under tremendous pressure. Toothpaste that "comes out a ribbon and lies flat on the brush" is extruded to form the ribbon. Did you know that material for sealing joints in structures prior to finishing is extruded in some cases? One such material is in ribbon form, with a cloth backing, and may be had in different widths and thicknesses. It is applied to joints and seams in aluminum construction, as well as to connections between transparent plastic and aluminum, as in hoods and turrets of aircraft. Joints thus sealed are tight against air, gasoline, oil, fresh or salt water.—H.

## Geo. Litchfield Advanced in Jones-Dabney Co.

The Jones-Dabney Co., Louisville, Ky., announces the appointment of Mr. George A. Litchfield as Vice President and Director of Sales. Mr. Litchfield joined the company ten years ago as a field representative in the Chicago area. Subsequently, he was promoted to Eastern Divisional Manager with headquarters in Malden, Mass. After successfully serving in this capacity, he was transferred one year ago to the company's main offices at Louisville, Ky., from which point he will direct the industrial sales activity of the company.

## Becomes Purchases Director for Sherwin-Williams

The Sherwin-Williams Co. announces the appointment of Robert F. Hennig as Director of Purchases of the company, succeeding the late Frank E. Davis. Mr. Hennig has been with the paint concern since 1927, when he started in the Cost Department. Successive promotions have placed him in increasingly important positions, as Asst. Director of Costs, later in the General Mfg. Dept., where he did formula and general cost analysis work, and still later as General Supervisor of Costs. In addition to this work, in 1942 he took on the supervision of priorities and allocation control. Later that same year he was also appointed manager of the Company's Chicago factory accounting work.

## Ace Laboratories Moves

Ace Laboratories (Consulting Research Chemists) formerly of North Ridgeville, Ohio, announces removal to 1616 Coutant Ave., Lakewood 7, Ohio, as of April 1, 1944. The company purchased an acre of land which is all fenced in and on which is located a new plant having 5000-sq.ft. of floor space. New equipment has been added, according to Mr. P. J. Zuris, Chemist and Owner.

## Sterling Announces Important Sales Plans

New sales plans were announced to a group of Company and advertising agency officials for the Sterling Tool Products Co. by J. A. Proven, General Sales Manager, at a luncheon recently held at the Medinah Club, in Chicago. Sterling manufactures electric and air-driven portable sanding machines for use on wood, metal and plastic.

Predicting a year of intensified and increased sales and manufacturing activity, Mr. Proven stated that plans for the present and postwar years call for 100% distribution through selected mill supply and automotive distributors and jobbers.

To effectuate these plans, Proven announced the appointment of two experienced men to head up advertising, sales promotion and distributor sales' service.

In charge of advertising and sales promotion will be R. D. Wyly, while William L. O'Byrne will take charge of distributor correspondence to see that distributors and their men receive the full benefit of all sales and marketing plans developed by the Company's sales, advertising and market research staffs.

# QUALASOLE

America's finest

Padding lacquer

## The Gem of Lacquer Finishes

"The Finish of Your Lacquer Problem"

**QUALATONE PRODUCTS, INC.**

21 GAY STREET NEW YORK 14, N. Y.

MEETING WARTIME RESTRICTIONS IN FINISHING

# Willow & Oak Caskets

BY FOREMAN FINISHER

WARTIME restrictions imposed on casket manufacturers, as to finishes, are as follows:

| | |
|---|---|
| Stain | (number of coats) 1 |
| Filler | 1 |
| Sealing primer (lacquer) | 1 |
| Varnish or other clear coating | 2 |

Not more than two coats of enamel are allowed for an opaque finish; or two different colors of transparent finish for each design; or two different colors of opaque finish for each design. Two colors of artificial grain finishes may be used in place of transparent finishes if desired.

I have worked out transparent finishes for willow as follows: These are known as Salex walnut and Salex mahogany.

First, putty all nail holes, etc., and let dry for two hours or more. Then sand to a smooth surface, being sure that the entire surface is sanded perfectly smooth. Otherwise the finish will be spotty, muddy looking and streaked. Dust off carefully before applying stain.

**Combination Stain-Fill; Wipe; Let Dry; Sand**

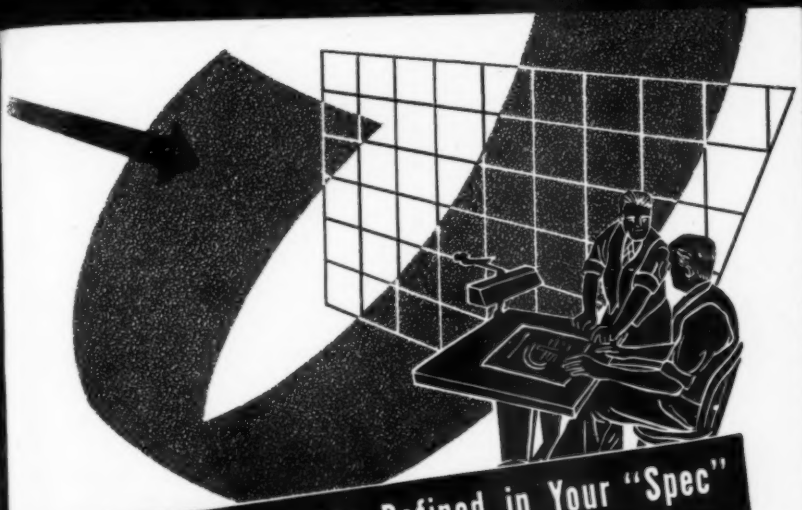
Make the combination stain and filler as follows: Start with, say ½-gallon of walnut or mahogany uniforming oil stain, made to wipe, and add 1-lb. of regular walnut or mahogany filler of this same shade of color. Mix the filler thoroughly into the stain. To this mixture add about one pint of naphtha. Then spray on a good wet coat, using about 40-lbs. of air pressure at the gun. It is important that a uniform coat be applied. Otherwise the stain color will be dark in the places where the stain was applied heavy, and light colored where the stain was applied thin.

After the stain-filler has been applied and set up for a few minutes, wipe off the excess crosswise of the grain, using soft rags and applying very light pressure on the rags, as willow is easily marred when rubbed crosswise of the grain—and cross streaks will show through the finish. After the entire surface has been wiped crosswise, clean it up thoroughly, wiping lengthwise of the grain. Continue cleaning until the surface is clear and perfectly clean. Use a pointed stick, about the shape of a lead pencil, for cleaning the filler out of crevices and corners.

Let this stained surface dry overnight in a drying room, or 12 to 18 hours at room temperature. Then sand it lightly with No. 6/0 sandpaper to remove filler nibs and lint, etc. Dust off thoroughly. If shading or coloring of sap streaks is to be done, use a shading glaze of suitable color and spray this on where it is needed.

**Spray Sanding Cleaner, Plus Finish Coat of Varnish**

Now spray on a cross coat (practically a doublecoat) of sanding sealer and let this dry about six hours at room temperature.



# We've Got the Wrinkle Defined in Your "Spec"

Name your own standards for a wrinkle, and, no matter how exacting, we're reasonably sure to give you precisely what you require. Judge for yourself.

**DO YOU demand a wrinkle that's tough?**

SEA-LAC wrinkles are especially developed to stand up under rough-and-scuff usage.

**DO YOU insist on a wrinkle that's uniform in pattern?**

SEA-LAC wrinkles are designed to produce a definitely even formation.

**DO YOU require a wrinkle that bakes hard rapidly?**

SEA-LAC wrinkles possess exceptional quick-baking characteristics.

**DO YOU need a wrinkle that is capable of being applied to any and every kind of wood and metal surface?**

SEA-LAC wrinkles have a remarkable affinity for all types of surfaces.

The superior character of Sea-Lac wrinkles is the end result of countless experiments and long research to work out a finish that would offer the highest degree of versatility. Try Sea-Lac Wrinkles. You'll see what we mean—to your complete satisfaction.

**DURALAC CHEMICAL CORPORATION**

LISTER AVENUE, NEWARK 5, N. J.

Use a sealer that will work satisfactorily over the stain-filler and under the varnish coat, which will be your top coat. This is definitely important. Sand to a smooth surface with No. 6/0 sandpaper, being careful to avoid sanding through the surface of the bare wood. If some edges are sanded through, touch them up with some of the shading glaze.

Dust the surface carefully and wipe it clean with a tack rag to remove all lint or dust particles. Then spray on one coat of high-gloss or semi-gloss good flowing varnish. Let this dry in a dust-free room from 36 to 48 hours, or in a drying room for 12 to 18 hours or more. If the staining and sanding have been done properly, you will have a smooth finish of pleasing luster that will have more appeal than if two or three coats of varnish had been applied.

It is essential that a good cross coat or double coat of sanding sealer be put on; and it is important that the surface be thoroughly dry before sanding; and the surfaces must be sanded smoothly. Otherwise, the finish will not be perfectly smooth.

### Finishing Oak Caskets

The finish for oak is done in the same way with the exception of the staining, which is done with a regular combination stain and filler such as you buy from the manufacturer. Several different shades can be obtained. If you prefer to make the shades darker after the filling has been done, some oak shading glaze can be sprayed over the entire surface, or you can shade certain places, as you do on willow. From then on the finishing process is the same as for willow.

If two coats of varnish are desired, the first coat can be sanded within 24 hours after it is put on. Then the second coat can be applied. However, it is seldom necessary for a second coat to be put on.

Of course, most finishes that include oil stain are susceptible to fading, when or if the finished article is placed in a window where the sun can shine on part or all of it. However, most casket manufacturers and morticians know this and avoid any such exposure of their finished caskets.

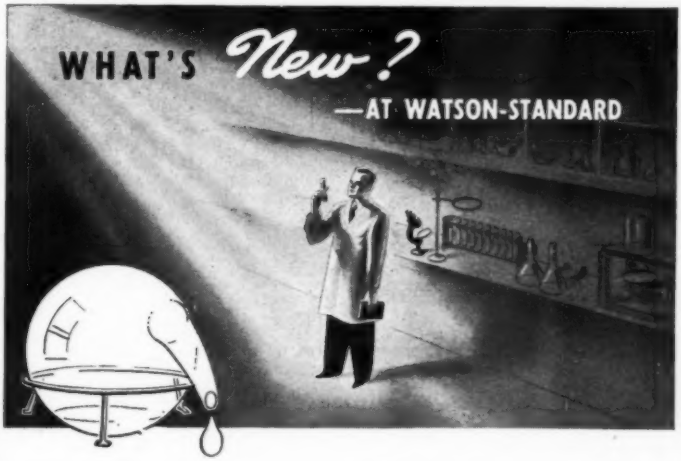
Any of these materials can be force-dried at temperatures not exceeding 120° F. Names of suppliers will be furnished on request.

## Flame-Proof Paint

Paint made of stone! It is an actuality. Carrying the stone pigment in a non-inflammable liquid vehicle, it adheres to any surface, and dries in about 24 hours. Sometimes it is mixed with sand and applied as a floor-covering material. On concrete, it provides a smooth surface. Sprayed on wood, it will flame-proof it, therefore we have another method of treating wood so it will not support combustion. The material is available in 5-gallon cans if desired, though it can be obtained in larger lots.

## Ventilation Literature

Eight new pieces of literature which together illustrate and describe approximately 50% of the line of ventilating equipment manufactured by The Allen Corp., 9751 Erwin Ave., Detroit 13, Mich., are off the presses and ready for distribution. This literature has been designed and written to provide a practical, down-to-earth treatment of ventilation problems and to offer solutions to these problems based on the experience of men who have spent years in the field of ventilating engineering.




## "C" ENAMEL — A TASTE-FREE SANITARY LACQUER COATING

Developed to meet the need of food packers for a coating made of non-critical materials, "C" Enamel, like so many war-born "substitutes," is proving far better in many ways than pre-war products: "C" Enamel is practically 100% taste-free and has the additional advantage of superior adhesion to electrolytic tin plate. Watson-Standard Laboratories are constantly on the alert for new and better finishes. You are invited to submit your finishing problems to the laboratory staff.

**WATSON-STANDARD CO.**

Manufacturers of
PAINTS · VARNISHES · INDUSTRIAL
FINISHES AND LITHOGRAPH COATINGS

FACTORY AND GENERAL OFFICES:
PITTSBURGH, PA. · WAREHOUSES:
BOSTON, BUFFALO, DETROIT, NEW YORK

TOUGH JOB HEADQUARTERS
℞ Prescription Finishes
Give us your metal coating problem. We guarantee you an answer based on your conditions, and not just a standardized formula.

# Materials Supplies Equipment

## Ivory White Shellac

An ivory white shellac produced by chemically treating orange shellac (recently released by WPB for certain civilian uses) is announced by The Mac-Lac Co., Inc., 127 Maiden Lane, New York 7, N. Y. The company has applied for a patent on this process, which was worked out by its chemists. This treatment makes the treated shellac (formerly orange shellac) suitable for use on various finishing jobs that formerly required bleached shellac. It complies with U. S. Government regulations.

## Metal-Impregnating Compound

Facts and figures about a new metal-impregnating compound (No. 988) developed by the Ault & Wiborg Division of Interchemical Corp., Cincinnati, Ohio, are disclosed in a 7-page bulletin just issued by the Company. A few condensed paragraphs from the bulletin are as follows:

Since all the impregnant remains in the porous casting as a resin, very efficient sealing is assured. No fire hazards are connected with either the mixing or storage of both the resin and monomeric styrene, other than expected of normal paints and varnishes.

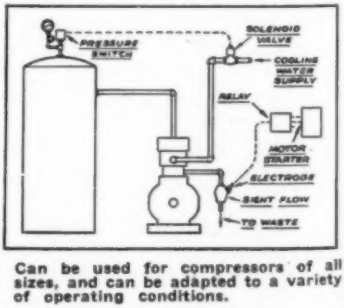
The usual process of impregnating is the vacuum-pressure method, where parts are placed in a large sealed tank. A partial vacuum is created to remove air from within the castings. The vacuum is then broken by drawing the solution into the tank, thoroughly covering all parts. Pressure is applied to completely force the liquid into the castings or metal parts. The liquid is then drawn off and the metal parts are allowed to drain. Excess material on the surfaces is washed off.

Curing or baking is preferably under air pressure. The recommended drying schedule is two hours at 275°F. The resin will maintain sealing efficiency under operating conditions up to 300°F. for prolonged periods.

The impregnation solution has the property of forming cross linkages between the styrene and resin molecules during baking, thus causing the solution to go from a thin liquid to a gel state. One might say the impregnant is actually "frozen" within the metal castings, therefore, it becomes impossible for it to exude or "ooze" out.

## Automatic Control for Water-Cooled Compressors

To protect water-cooled compressors against damage from over-heating, which results if they are operated without cooling water, and at the same time to prevent unnecessary and costly waste of water, the Johnson Corp., Three Rivers, Mich., has developed a new compressor control. By permitting the compressor to operate only when water is actually flowing through it, this control guards against failure of water sup-




**Can be used for compressors of all sizes, and can be adapted to a variety of operating conditions.**

Since 1875

O'BRIEN

INDUSTRIAL FINISHES

Not the Most · · Just the Best

## WHY AND WHEREFORE

THE QUESTION "Why?" is the perpetual guiding light for all investigators seeking truth.

Industrial finishing processes and products are often required to meet standards of utility and storage long before final performance is demanded.

One O'Brien product had to be applicable by immersion or dipping methods on a timed production line. It had to flow uniformly for some 72 inches and drain relatively free from lining, streaking or ribbing, with extreme parallelism of surface or constant film thickness in a specified time, without fatty beading. Then it had to bake at prescribed temperatures for minimum lengths of time to produce a dense, flexible, tough rust-inhibiting prime coat over which any type of finish could subsequently be applied by any one of four different methods. This O'Brien product had to "take" lacquers of strong lifting proclivities, or baking or air drying enamels, with perfect bonding between coats.

Finally, after all of these properties had been attained, and despite the natural tendency of liquids to evaporate and drying oils to polymerize, this same primer had to be so stable in the dipping tank that even after constant aeration and frequent settling periods it could be thinned back to its original weight without having taken on any viscosity.

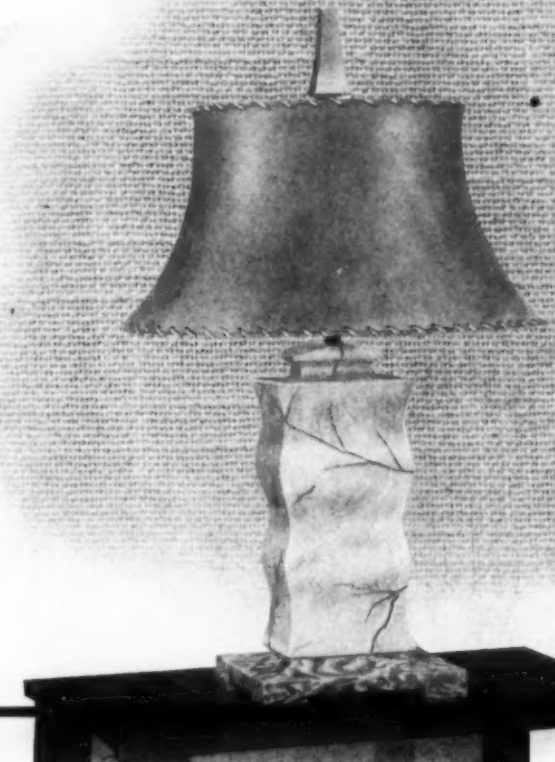
O'Brien's succeeded in solving the riddle of this metal primer by making use of all available experience and data while benefitting from the cooperation and constructive criticisms of the client.

Solutions to such problems are never stumbled onto just by accident. In research nothing happens by accident. Long years of experience, a definite program and a guiding hand caused the "accident" to happen.

Present day industrial finishing requires the constant surveillance of technicians especially trained to provide the answers to "why" and "wherefore."

O'Brien's are happy to apply the full force of their long established research to the economic development of any sound finishing problem.

**O'BRIEN VARNISH CO.**
**South Bend 21, Indiana**



*Sans-Arb*

AND

*Sans-Marb*

LACQUER VENEER FINISHES

BY

*Meyercord*

*End Table*:
Sans-Arb mahogany
crotch lacquer veneer

*Lamp Base*:
Sans-Marb Brazilian
marble—Mexican onyx

SEND FOR
FULL COLOR
BROCHURE
OF WOOD
& MARBLE
LACQUER
VENEER

*the* MEYERCORD CO... CHICAGO 44, ILLINOIS

ply from any cause whatsoever, and consequently permits the safe use of automatic water cut-off valves.

The Johnson control consists of a sight-flow fitting, mounted in the water discharge pipe of the compressor, which serves as a holder for a metal electrode. When pressure in the receiver falls below the the predetermined level, the pressure switch on receiver opens a solenoid-controlled valve to admit cooling water to the compressor. The compressor is not started until water flows through it into the sight flow, completing circuit with the electrode. If for any reason the water supply fails, the compressor will not be started, or if it is operating it will be stopped immediately.

## Infra Red Heat From Hand Lamp

Infra red heat from what you might call a large-bowl flash light with an attached cord that plugs into your 110-volt light circuit—this is the latest offering of Fostoria Pressed Steel Corp., Fostoria, Ohio. A convenient handle is attached so you can direct the heat rays toward whatever you want to heat.

It has hundreds of uses in the factory, work shop, garage and home. The manufacturer declares that 20-gauge black metal, 1½-in. in diameter, can be heated to 1000°F. in 1½ minutes when the edge of the reflector is spaced 2½-in. from the metal. Quick heating by this method is much cleaner, safer and quicker than by an open flame.

To purchase one of these units requires a priority rating of AA-4 or higher.

## Deoxidine, A Safe Cleaner

Deoxidine, a product of American Chemical Paint Co., Ambler, Penna., is the original phosphoric-acid type of cleaner for metal to be coated—and is highly desirable and efficient. Deoxidine contains, in general, phosphoric acid, grease solvents, wetting agents, emulsifying agents and sometimes inhibitors of acid attack on steel. It is formulated for use hot or cold, of various acid strengths and with various amounts of grease-removing agents, so that it may be used for the removal of all but the heaviest grease.

Use of the correct type of Deoxidine (whether or not preceded by a preliminary cleaning in alkali or by pickling in sulfuric or hydrochloric acid) affords a method for removal of visible impurities which leaves the least amount of invisible harmful residues.

Traces of phosphoric acid left behind are not harmful to paint life. Also, the company claims that work cleaned with Deoxidine is less sensitive to the final rinsing than work cleaned with, for example, alkalies or the usual pickling acids. (Alkali cleaners will not remove rust or scale.) The importance of the final rinsing operation cannot be minimized.

## Protective Hood Supplied With Air

A lightweight, air-supplied hood to protect workers in paint, finishing, and allied industries is announced by the Wesley A. Gibbons Co., 516 S. Woodward Ave., Birmingham, Mich. Called the Taeco hood, it guards the eyes, ears, face, neck, and respiratory organs from harmful and irritating substances, mists, vapors, fumes, and dusts. It is designed to afford safety, comfort, and freedom of body

It is adaptable for many purposes.

# HILO NC BLACK CRYSTAL

## NOW READY! NO PRIORITY!

Successor to our famous No. 916 Black Crystal (which is a victim of war) this new Hilo finish stands squarely on its own merits.

- **It's JUST AS TOUGH**
- **It's JUST AS BLACK**
- **It's JUST AS ATTRACTIVE IN DESIGN**
- **It's JUST AS SPARKLING**
- **It's SLIGHTLY SMOOTHER**

And you can use it in the same way . . . apply it—crystallize it—bake it!

Hilo NC Black Crystal is suitable for all kinds of wood and metal surfaces . . . cameras, radios, signalling instruments, field equipment, sound devices.

***Write for New Bulletin No. 8-1 and Free Sample***

HILO

**HILO VARNISH CORPORATION**

42-60 STEWART AVENUE BROOKLYN 6, N. Y.

2420 Washburne Ave., Chicago 8, Ill. Park Square Bldg., Boston 16, Mass.

movement and to allow easy replacement of all parts. This pliable hood weighs only slightly more than a man's felt hat and is fitted with replaceable forehead pads.

Compressed air at low pressure, from the same supply used to service a spray gun or similar equipment, is fed into the hood through a distributing tube which is held in position at the operator's waist by a belt clip. A removable diffuser allows the air to expand and discharge at the top of the hood from where it floats down over the operator's head.

Two models are offered. One, called the Vapo hood, is designed for use principally for spraying paint and other liquids. The eye mask is cut out to prevent hampering of operator's vision by mist. Air flowing out through the eye openings keeps vapors from entering.

## "Tectyl" Gives Protection Against Corrosion

Tectyl products are liquid compounds designed to form a temporary protective film over bare metal surfaces. The film also affords some lubricating qualities.

The five Tectyl products provide means for cleaning and preserving metal and metal products of all types. Because of the polar nature of these compounds, the preservative qualities vary directly in proportion to the electrical conductivity of the substance to be preserved. Thus, Tectyl compounds provide maximum protection against the rusting of iron and steel and corrosion of copper, magnesium and other metals capable of conducting electric current.

Tectyl compounds are liquid and are true solutions. They are homogeneous in nature and flow readily at ordinary temperatures. They have two major elements: a solvent which evaporates and the active polar compound which remains as a protective coating or film.

Each of the Tectyl liquids may be applied by use of a spray, by dipping, brushing or by flushing the metal surfaces to be protected. All are soluble in such solvents as kerosene, carbon tetrachloride or even in ordinary lubricating oils.

These compounds deposit a thin, transparent, easily removable film. Depending upon the nature of the preservative desired, protection can be obtained for as long as two years in outdoor weathering.

These materials are products of Valvoline Oil Co., 5th & Butler Sts., Cincinnati, Ohio.

## Compressed-Air Motors Are Explosion-proof

Where explosive or inflammable liquids, gases or fumes are present, great care must be observed in the operation of gasoline engines or electric motors. On the other hand, a compressed-air-operated airmotor offers safety for it produces no sparks, flame, etc.

Leiman Bros., Christie St., Newark, N. J., now makes a rotary airmotor which offers a wide range of speeds and power. The compressed air used may vary from 1-cu.ft. per minute up; the air pressure from 10 to 100-lbs. per square inch; the horsepower will range from .03 up as high as you may want to go; the speed may be 50-rpm. or 1800-rpm., or in between.

Here is offered power and speed un-

Typical compressed-air driven motor.

# Hardwood Finishing Headquarters

**SINCE 1868**

**DRIER**

"K" JAPAN ..... Gal. ..... Quart ..... Pint ..... ½ Pint

"B" TANK ..... Gal. ..... Quart ..... Pint ..... ½ Pint

WHITE ..... Gal. ..... Quart ..... Pint ..... ½ Pint

**ENAMEL**

FRENCH PORCELAIN WHITE

SPIRIT ENAMEL ... Gal. ..... Quart ..... Pint ..... ½ Pint

**SYNTHETIC ENAMEL**

Synthetic Enamel (Behloid) Gal. ..... Quart ..... ½ Pint

***Color Card (on Request)***

Synthetic Primer (Behloid) ... Gal. ..... Quart ..... ½ Pint

Synthetic Reducer (Behloid) Gal. ..... Quart ..... ½ Pint

Enamel Undercoat ..... Gal. ..... Quart ..... ½ Pint

Filler Paste Form ... 10 lbs. ..... 25 lbs. ..... 100 lbs. ..... bbl.

All Shades

Special Chemists and Color Experts
Will Match All Colors and Types.

**FLINT PAPER**

Sandpaper—
Ream (480 Sheets) ..... Quire (24 Sheets) .....

Garnet Paper and Cloth—
Ream (480 Sheets) ..... Quire (24 Sheets) .....

Emery Paper and Cloth—
Ream (480 Sheets) ..... Quire (24 Sheets) .....

Illustrated catalogue of complete finishing materials that will take care of your finishing requirements.

**H. Behlen & Bro., Inc., 10 Christopher St., N. Y. C. 14**

der absolute control by the turn of an air valve, just like you would do in pressing your foot on the gas control of your car to get speed and power.

The motors are reversible by the same means of air valve control so that this, combined with all of the other desirable features, makes them available for power purposes wherever a compressed-air supply is used, even though no fire risk or hazard may be present.

## No. 100 New Lac, A New Clear Primer-Sealer

A clear synthetic protective coating with exceptional adhesion to metal, wood and other surfaces, is announced by the New York Woodfinishers' Supply Co., Inc., 109 Imlay St., Brooklyn 31, N. Y.

The product is called No. 100 New Lac. It is an excellent shellac replacement product for porous surfaces, such as wood and fiberboard; makes a quality sealer and primer; is quick drying and, because of its great adhesion to metal and non-porous surfaces, it forms a very good bond between "hard to paint" surfaces and subsequent finish coats.

As a first coat on metal, this material forms a solid foundation for the support of other protective coatings applied over it. It has excellent adhesion to bare metal. This product can be thinned with denatured alcohol in any proportion without separation, and dries quickly to an unusually pale, clear and tough film.

## Fungus-Resistant Lacquer

Commmunications equipment that soon became useless in tropical climates is now being protected from high humidity and fungus growth by a new lacquer, developed by Maas & Waldstein Co., 438 Riverside Ave., Newark, N. J.

When our troops first entered the tropics, moisture saturated ground signal equipment and provided an ideal breeding ground for fungi. These growths, absorbing and holding water like blotting paper, covered parts of equipment and caused short circuits.

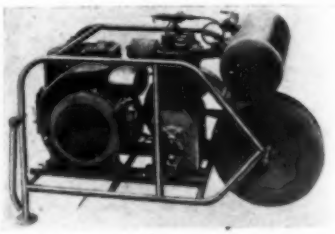
At the request of the Signal Corps for assistance on this problem, Maas & Waldstein developed a lacquer that is moisture-resistant, has high dielectric strength, and retards the growth of fungi. It is now being used on signal and other communication equipment at our tropical bases.

The new lacquer, marketed as Dulac Fungus-Resistant Lacquer No. 86, may also be used to treat communications equipment before it is assembled and shipped to the tropics. Complying with U. S. Signal Corps Specification No. 71-2202-A, it is a clear, quick-drying lacquer that may be put on by spraying, brushing or dipping.

## Wheelbarrow-Type Air Compressor

Designed originally for the armed forces, many postwar uses are foreseen for the new, compact, wheelbarrow-type air compressor unit being manufactured by the Quincy Compressor Co., Quincy, Ill. Weighing only 225 lbs., the unit is easily wheeled by one man.

Despite its small size, the unit incorporates a powerful single-stage, air-cooled, Model 216 Quincy compressor with an air delivery in excess of 16-cu.ft. per minute at 80-lbs. pressure. The compressor operates at a speed of 1250-r.p.m., approximately double normal compressor speed.



Portable, handy, efficient, economical.

# — The Great Discovery —

# Lubrisol Pad-O-Paque Process

## REPAIRS - REFINISHES DAMAGED SURFACES

### *"The Greatest Time, Labor and Material Saver Known"*

**It solves the most serious problems finishers have faced in recent years, those of repairing the new types of finishes, namely: the new Synthetic, the Wiping Stain, the Bleached, the Prima Vera, the Glazed Blonde, the Decalcomania Plastic Veneer, the Grained, as well as the Color Stained Shot-on Finish.**

HERETOFORE, the most difficult job connected with finishing has been that of repairing damaged surfaces, particularly when confronted with the newer type finishes.

However, after years of research and experiments, we were able to develop this process for the quick and easy repair of all types of finished surfaces on wood and metal products.

### LUBRISOL PAD-O-PAQUE PROCESS SOLVES THE PROBLEM

No specialized knowledge or experience is required to use this process. It is now being used successfully by thousands of finishers and refinishers throughout the country.

The regular PAD-O-PAQUE part of the process consists of sixteen different shades of Prima Vera, Walnut, Maple, Mahogany and Blonde, also Black and White, from which any modern finish may be matched.

The colored PAD-O-PAQUE part of the process is for all kinds of finishes on metal products and consists of Black, White and light medium and dark Yellow, Red, Orange, Blue and Green for matching any finish.

LUBRISOL is a quick-drying finish applied by padding on with a cloth after the PAD-O-PAQUE has matched the shade or color of the damaged surface and after shellac stick "burn-in" repairs. It is supplied in high gloss, satin or flat. It quickly pads out "burn-ins," PAD-O-PAQUE repairs, press marks or crazes with little effort. LUBRISOLVENT may be used to reduce viscosity of LUBRISOL to suit any repair job.

. . . Write for folder containing complete description of the nationally famous LUBRISOL PAD-O-PAQUE PROCESS.

## FINISHINE LABORATORIES, INC.

**SYRACUSE 4, NEW YORK**

*Our Slogan: "Thousands for Research—Without One Cent of Regret"*

## Conductive Coating Materials

Conductive coatings containing silver powder are now being manufactured commercially by a special process by the Du Pont Co. (Ceramic Products Div., Electrochemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Dela.).

These products, when applied to a variety of non-conductive materials, produce a surface of low electrical resistance and high conductivity. Typical of the base materials to which these coatings may be applied are: glass, porcelain, steatite, plastics, wood, cloth and paper. Aging or exposure to sulfides has only a slight effect on the high rate of conductivity. The coatings, which are a dull metallic gray, can be applied by spraying, dipping or brushing, followed by air drying and, in some cases, baking.

A number of coating materials with different characteristics have been formulated. The differences in each are intended to meet certain requirements such as the base material to be coated and certain degrees of adherence and film toughness.

## Protective Coating for Plastic Surfaces

Protecto-Kote (M-13870), a liquid coating used to guard plastic surfaces in airplanes during fabrication, is now being produced in quantity by the Reserve Research Co., 1637 Superior Ave., Cleveland 14, Ohio.

Protecto-Kote dries rapidly, forming a protective coating against scratching and abrasion. It is impervious to grease, paints and paint solvents. It is used on such aircraft plastic surfaces as window lights, instrument panel plastic installations, etc., including such materials as Methyl Methacrylate, "Plexiglass, Lucite," Cellulose Acetate, laminated safety glass, etc.

In use, the entire piece of plastic ing Protecto-Kote, drained, and then can be dipped into a tank containallowed to dry. Protecto-Kote can also be sprayed onto the plastic. Coverage is 200-sq.ft. per gallon and one coat is sufficient.

Plastic covered with Protecto-Kote can be stacked, handled and delivered to assembly lines without use of flannel protecting cloth or other means of protection between the pieces. It is water-soluble and easily removed. No cleaning or polishing of plastic is required after removal.

## Emulsion Cleaner Concentrate

Pennsalt E No. 2, announced by the Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia 7, Penna., is a concentrate-type emulsion cleaner comprising soaps, blending agents, and co-solvents for industrial grease cleaning applications. It is soluble in water and in hydrocarbon solvents. It may be diluted with from 5 to 20 parts of suitable solvents such as low-cost kerosene, Stoddard solvent, or light fuel oil distillate.

Uses suggested by the Special Chemicals Division of the manufacturer are as an emulsifying solvent in removing carbonized oils, grease, smut, and drawing and buffing compositions. It finds use as a precleaner, prior to painting or electroplating, yielding a physically clean surface, and is also applicable to power washer and soak tank operations in water emulsion form, or to increase the effectiveness of alkaline cleaners. The material also acts to inhibit rust formation. Packed in 55-gallon drums, it is available in commercial quantities.

## Insulating Varnish

A clear baking varnish of great flexibility, for use on electric wiring and electric coils, has been developed by The Sterling Varnish Co., 141 Ohio River Blvd., Haysville (Suburban Pittsburgh), Penna. It is called R-851. It dries completely throughout when baked at a temperature of 275°F. The dried insulation is oilproof and affords a protection that is exceptionally resistant to water, acid and alkali.

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JAMES B. DAY & CO., CHICAGO

## How to Kill Glare of Inspection Charts

We have an inspection problem which might be solved with an appropriate paint finish. In order to check some index points on glass thermometers, the tubes are laid on a white paper chart which is cemented to a stiff metal back. The glass tubes are moved back and forth over the chart which is ruled in black ink lines. Eventually, this rolling of glass tubes over the printed paper charts produces an appreciable amount of deterioration to the paper. Also, there is a serious reflection of light into the inspector's eyes, caused by the sheen of the chart.

We are wondering if there is a protective finish of perhaps a plastic base which would solve the wearing and reflection problems of our inspection operations?—T. I. Co.

---

Our first suggestion is that you try coating your white paper charts with a flat lacquer or flat varnish —preferably one that is lightly or mildly tinted with transparent light gray, light green or light blue. You will probably have to do this tinting yourself, or have it fixed up special, as we presume that you would not find anything like this in a paint manufacturer's regular line.

It would seem to us that your charts should be printed on a soft non-reflective lightly-tinted paper stock, and then coated with a transparent film of flat lacquer or varnish. We can readily understand why this reflection of light from the smooth white paper charts could produce severe eye fatigue.

Another idea is to paste your paper chart over a ground glass (like those used in cameras) and place a light under this. You have probably seen this idea in some camera shops where they have a ground glass with a light under it, so amateur photographers can look through their negatives instead of holding them up to the daylight. You might do some experimenting in connection with this idea. If the light seems to be too strong, the paper chart or the glass or the light bulb might be mildly tinted light green, light gray or light blue.—ED.

# Questions and Answers

---

## Casket Finish Without Staining or Filling

In March issue, pages 90-91, I noticed an inquiry regarding a combination stain and filler that would not have to be padded or rubbed, and I also note your answer, which was very good. Since this is a casket company, I have a suggestion to make that might be of interest to them, and perhaps to others. I have worked out a finish for open-grained wood that does not require staining or filling, but it looks like a stained and filled piece of work, with the exception of not being quite so smooth as a job that is stained, filled, sealed

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and varnished. However, this finish has been acceptable and it looks good. It can be put on with a minimum amount of labor and material.

Here is how I produce the finish: For instance, if I want to finish oak in a medium brown oak color, I take clear wood lacquer and tint it with rich brown oak stain. This color coat must not be too strong in color, as it will have a tendency to darken up too quickly when sprayed on the wood and it might come out streaked or spotty. I thin the wood lacquer a little so as to be able to go over the work twice without building up too much of a lacquer film. By carefully spraying this color coat over the surface, and going over it a second time, a rich brown tone will result.

After this color coating dries for half an hour or longer, I spray on a wet coat of wax. This wax should be approximately the same shade of color as an oak filler that is used to produce a rich brown oak finish. The wax should be cut with naphtha and applied with a brush in order to work it down into the pores of the wood. Then the surplus is wiped off and the waxed surface is polished.

If the wood is brushed lengthwise with a wire brush, before the color coat is applied, and then dusted out thoroughly with compressed air, the pores will show better, and this treatment will make the grain of the wood show beautifully after the wax has been applied.

This finish can be produced in practically any color desired. It is a good serviceable waxed finish when completed, and one that can hardly be distinguished from a stained and filled finish. Numerous contrasts can be obtained by using contrasting colored waxes over the tinted lacquer coats.

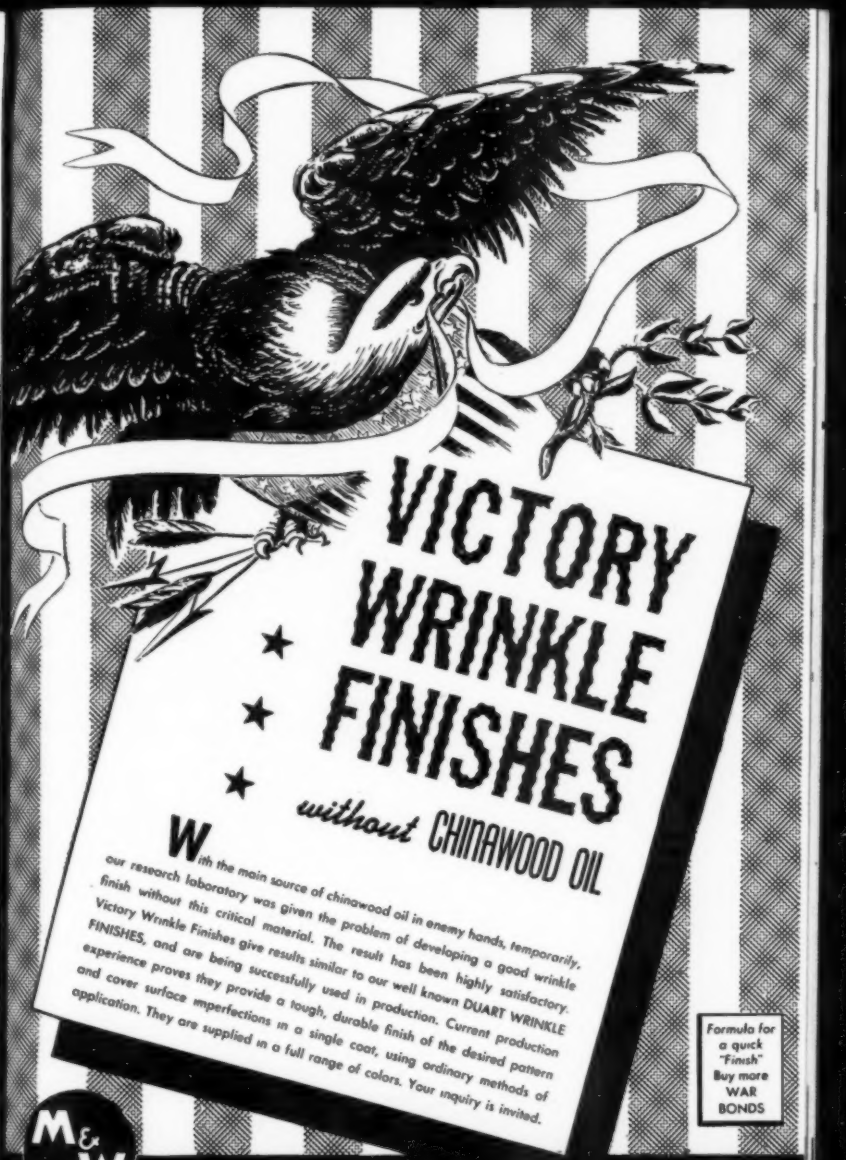
If so desired, the surface that has been lacquered can be either sanded lightly with a fine sandpaper or steelwooled with a 4/0 steelwool, but this is not absolutely necessary if care is taken in applying clean materials and straining all materials before applying them to the surface.—F. H. COHAGAN.

## Caskets Finished Metallic

Referring to the letter signed "B. H." on page 8 of March issue, under the above title: First of all the wood must be thoroughly kiln dried, so you can be sure that the wood will not expand or contract under the finish. This would cause an unevenness which would affect the polished surface. If lumber has not been properly dried, no matter how well the pores may have been filled, or how carefully the finish has been applied, or how expertly it has been rubbed and polished, there is certain to be some contraction or expansion and a resulting unevenness, sufficient to detract from the appearance of the finish soon after the work is done. This trouble may continue indefinitely without its cause being ascertained, because men persist in looking for the cause of trouble in the immediate vicinity, when things go wrong.

When the highly polished, mirror-like finished surface grows dim before its time, either the method or material used in finishing is usually held accountable, and all eyes are turned toward the finishing room as the source of trouble.

A careful examination of the finish reveals the fact that the surface is gradually growing uneven and this uneveness is the cause of



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## *without* CHINAWOOD OIL

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the dimness; and the cause of the unevenness is expansion and contraction of the wood due to improper kiln-drying.

Suppose then that the wood has been properly kiln-dried. We will take oak as an example, as I have successfully finished oak in a metallic finish. First of all, fill the wood pores with a natural wood filler; let dry at room temperature for 48 hours; apply one heavy wet coat of synthetic surfacer; let dry over night; sand to a smooth surface, using No. 150 sandpaper and a felt sandblock; spray any color of metallic finishing material desired over the thoroughly dusted and cleaned surface; shade or decorate as desired; and finish with one or two coats of clear lacquer or clear synthetic material.

If so desired, a coat of lacquer primer can be used over the sanded surface. When dry, the color coats can be sprayed over the lacquer primer. When top coats are thoroughly dry, rub and polish in the usual manner.—F. H. COHAGAN.

## Cleaning Metal

Cleaning of metals preparatory to finishing has long been a matter of study with production men. Naturally, different cleaning preparations have different merits, or the same merits to a lesser or higher degree. One liquid cleaning material has been designed for spraying or flowing through nozzles at a pressure of 20 to 30-lbs. per square inch, in a pressure-type alkaline washing machine; it not only removes oil, grease and drawing compounds from the materials, but deposits a light phosphate rust-preventing film, and at the same time slightly etches the metal to provide a surface to which paint will more readily adhere.—J. P.

# Booklets Catalogs Circulars

## Air Equipment Book

"Air Processing Equipment" is the title of a new catalog just released by Peters-Dalton, Inc., designers, engineers and manufacturers of industrial equipment and complete air processing systems, 628 E. Forest Ave., Detroit 1, Mich.

This 56-page book shows innumerable installations of Peters-Dalton dust-collecting units and systems, spray booths and equipment, ovens, ventilating equipment and completely engineered air-processing systems. It tells an interesting story of Peters-Dalton complete engineering facilities, and includes detailed specifications of Hydro-Whirl dust collectors and spray booth units, together with engineering data of immeasurable value to those with air-handling problems.

A copy of this spiral-bound colorful catalog will be mailed without charge to plant executives who request it on their company letterhead.

## How One Company Ended Its War Contracts

A free booklet of 12 pages in color entitled, "How One Company Organized to Handle War Contract Terminations," is offered executives by Lyon Metal Products, Inc., Aurora, Ill. It contains a step by step, graphic presentation of the subject; gives a suggested breakdown of termination duties by departments; sets time limits for each department; illustrates 14 practice-proved forms which the company designed to expedite the work. The book makes no attempt to "interpret regulations." The preparation of this book was suggested after it had been reviewed by Chicago Ordnance, Army Service Forces at Washington, and the National Association of Manufacturers.

Many companies faced with termi-

# THE NEEDS OF INDUSTRY

As industry approaches the peace it becomes apparent that chemistry must be a working partner of conversion. New problems, new products, new techniques . . . all demand its helping hand.

Chemical coatings are doing more than meet the peace-time needs of industry. They are creating industry . . . molding industry . . . changing the entire course of production. In test tubes fired by war, thousands of new products, new processes and new profits have been born.

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nations for the first time will be able to adapt this plan in part or in its entirety and save themselves considerable time and effort. Once the method and the personnel within a company are organized to obtain the facts, any termination regulation changes can be easily fitted into the already established method of handling.

## Specification Finishes

A loose-leaf service catalog of U. S. Government Specification Finishes has been compiled and published by the Lacquer & Chemical Corp., 222 40th St., Brooklyn 32, N. Y. This company manufactures "Alaka" finishing materials. Every page in the catalog is printed in two colors. The pages are enclosed in an attractive red, white and blue binder.

## Postwar Planning Book

Designed to help untangle the many conflicting statements concerning our postwar economy, 286 of the most vital peacetime plans and projects now underway in American industry have just been summarized in "Postwar Planning Now," the latest transition study published by the N. Y. Journal of Commerce.

The actual peacetime outlook in 56 major industries; descriptive details of new products, services and processes; and the formula for a gradual lifting of price, priority and ration controls are thus compiled for the first time under one cover.

All the material for this second edition of "Postwar Planning Now" was obtained from data furnished by key industrialists, government and trade association officials. Copies may be had at 25 cents each from the N. Y. Journal of Commerce, 63 Park Row, New York 15, N. Y.

## Storing, Handling, Using Industrial Tape

A manual containing an important message on conservation for all users of pressure-sensitive industrial adhesive tapes has been printed and distributed by Bauer & Black, Division of The Kendall Co., Chicago, Ill. In it are suggestions for storing, handling and using tapes in order to effect the greatest economies, and to conserve supplies of this critical material.

The contents are arranged departmentally, so that department heads, store room personnel and the actual users of the tape can learn, with a minimum of reading, how to do their special parts in the job of conservation. Individual sheets are detachable and complete in themselves for posting on bulletin boards or for distribution to particularly interested departments of your business.

Copies of the complete manual in booklet form, or additional copies of any sheets or any section of this manual, may be obtained by writing on your company letterhead to Bauer & Black, Industrial Tape Division, 2500 S. Dearborn St., Chicago 16, Ill.

## How to Colorfully Decorate Old and New Furniture

Hundreds of ideas, suggestions and examples of restyling old furniture to make it new and attractive, and how to apply color decorations to juvenile furniture, playthings and household articles (new and old)—all of this and more is revealed in Du Pont's new illustrated free book called "Transformagic." It contains 64 pages, 5½x8¼-in. Many of the pictures are in full color. It gives the step-by-step instructions on how to paint Peter Hunt designs, as painted by Peter Hunt of Provincetown, Mass. Send for your copy by writing to E. I. du Pont de Nemours Co., Public Relations Dept., Wilmington 98, Dela., or 350 Fifth Ave., New York 1, N. Y., or communicate with your local Du Pont dealer or representative.

## Standard Pickling Control

The American Chemical Paint Co. recently published an illustrated technical service data folder on "Rodine," a standard control for the pickling bath. The Rodine process revolutionized pickling of steel and has been responsible for saving vast quantities of metal since its introduction. For a copy, write to American Chemical Paint Co., Ambler, Penna.

## Reconversion Booklet Free

A little 8-page booklet entitled "Reconversion—Why, How and When?", contains an interesting informative article on this timely subject. It is easy to read and contains quick facts and practical suggestions. The booklet is published by J. O. Ross Engineering Corp., 350 Madison Ave., New York 17, N. Y., manufacturer of equipment for drying, baking or heat conditioning freshly applied paints on all kinds of products.

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*may be in*

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U. S. and Possessions.....$2.00
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# Editorial

## Intelligent and Useless Analyses of Paints

★ One of the favorite approaches a finishing material salesman uses when trying to break into a new account is to obtain a sample of the material the prospect is now using, in order that his laboratory can analyze it and submit its own sample. As far as that goes, this is a logical approach. Many times I have made this request of the salesmen with whom I worked before I submitted my sample.

The thought uppermost in the eyes of the salesman is to give his prospective customer exactly what he has been using. If the customer wants a sanding sealer that powders freely, even to the extent of having too much sanding agent, and thus being of poor quality otherwise, the salesman wants his company's product to be just the same. In reality his regular sealer might be of much higher quality, but if it doesn't have the sanding characteristics his customer desires, his reaction is to alter the sealer, even at the expense of quality.

Although I know the answer, why doesn't the salesman point out the merits of his company's material, as compared to the material the customer is now using? Well, I guess his natural reaction is to cut down all possible sales barriers and take the line of least resistance. It is easier to obtain a sample of the customer's material and have his laboratory analyze it and submit a duplicate.

Many times the salesman asks what is in this or that paint? I don't know what kind of an answer he expects. Oftentimes I wonder if he thinks the laboratory makes a complete chemical and physical examination of the sample. If he does he is sadly mistaken. Few people actually realize the complexity of paint. So complex is it,

★ Guest Editorial . . . Many readers can write an excellent editorial—two or three paragraphs that present a timely suggestion or valuable idea which will stimulate real thought on a live subject. The Editor welcomes guest editorials and pays for those that are published.

# SOME LIKE IT COLD

..some like it hot.....

NITROCELLULOSE LACQUER can be sprayed hot, too! This recently perfected process increases solids content . . . saves volatiles . . . cuts the number of coats in half. Savings in time, labor, materials, and spraying equipment make "Hot" Lacquer a logical finish for innumerable industrial products. Ask your supplier about the "Hot" Lacquer process.

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in fact, that no chemist has as yet analyzed its chemical and physical structure.

Although it is extremely difficult (and of course it varies from one type to another) it is possible to analyze the chemical composition of a paint. On the other hand, it is thus far impossible to determine the physical manner in which these chemicals are combined. Suppose, for example that a paint is composed of the following materials: Carbon 5%, oxygen 7%, hydrogen 15%, lead 23%, zinc 15%, titanium 10%, calcium 13%, barium 6% and chromium 6%. These results are meaningless unless it is known in what manner the various chemicals are or were combined. To make the point clearer, can you visualize a house that is described in the following manner: Wood 17%, brick 25%, mortar 2%, nails 1%, concrete 25%, shingles 15%, paint 1%, glass 4%, steel beams 5%, tile 5%?

In reality, the chemist prefers his analysis to be the physical properties of the paint before and after application. For example, we test the solid content, viscosity, hardness, flexibility, acid and alkali resistance, water resistance, exterior durability, and many other characteristics, depending on the type of product. Such an analysis as this is comparable to a real-estate agent describing that house in the following manner: One story, 6-room, combination frame and brick, contains large living room with fireplace, good sized dining room, a pleasant light kitchen with the most modern conveniences, three well-ventilated bedrooms, and a tiled bathroom. Full basement with laundry facilities. Also a 20-year guaranteed roof, and double garage. Such a description doesn't give the thorough analysis of the one where the percentage of each building material is given, but there is no doubting which is more practical.—RAYMOND C. ADAMS.

DON'T BE AN ACCIDENTEE!
I UNDERSTAND HE TRIED TO DESIGN SAFETY CLOTHES THAT'D PLEASE ALL THE GIRLS!
NATIONAL SAFETY COUNCIL

## Developing Postwar Finishing Materials

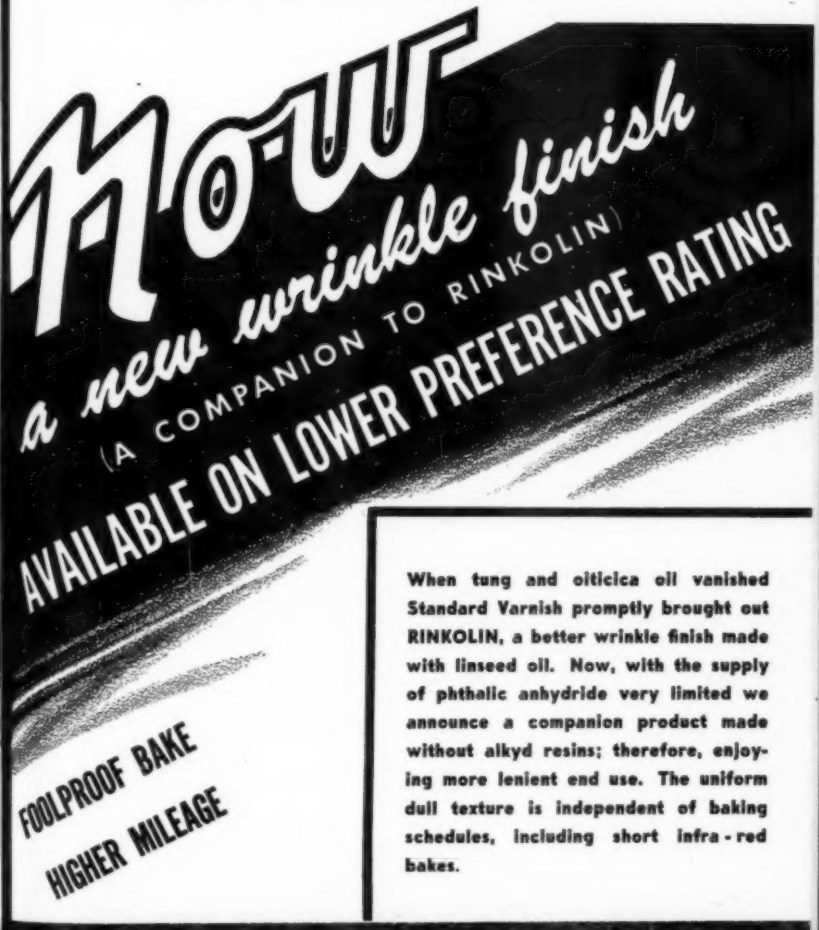
★ Most of the finishing material manufacturers are busy today planning and formulating materials for postwar finishes. They are devoting much time and spending a lot of money to this end.

While our "war finishes" on civilian goods are, in most cases, not as good as prewar finishes, we are using them and getting by, as this is the only thing we can do. Our customers realize that we are doing the best we can, so they don't kick.

But after the war, when things return to normal and when the customer doesn't have as much money to spend, he will want more value

# Standard Scores Again!

RINKOLIN First Linseed Wrinkle




**When tung and oiticica oil vanished Standard Varnish promptly brought out RINKOLIN, a better wrinkle finish made with linseed oil. Now, with the supply of phthalic anhydride very limited we announce a companion product made without alkyd resins; therefore, enjoying more lenient end use. The uniform dull texture is independent of baking schedules, including short infra-red bakes.**

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for his money. Then furniture manufacturers will find the market a customer's or buyer's market instead of the seller's market as at present. Furniture buyers will demand better finishes and the furniture manufacturer will demand better finishing materials from his supplier.

I am sure that money and time used in developing new materials will be time and money well spent. I am also sure that the fellow who does not plan to produce improved postwar finishes will face a lot of difficulties from his more wide-awake and alert competitors.

Finishing material houses have done a splendid job in developing substitutes for use on civilian goods during this war, and I am sure that they will do a more marvelous job in producing postwar finishes.—H. W. CHESTER.

---

## *Random Comment on the Industrial Scene*

BY LAWRENCE H. SINGER

**Thin Wood on Metal**—Furniture makers will be particularly interested in Pliobond, recently developed in the research laboratories of the Goodyear Tire and Rubber Co. Wood veneers as thin as 1/48-in. can now be cemented to a metal surface.

Pliobond, a rubber-like material requiring no critical components, is spread on the metal sheet. After the layer of wood has been fitted over it, moderate heat and pressure are applied in a press for 15 minutes.

An important element of appeal is found in this feature: A lighted cigarette will not mar the wood veneer, because the heat is quickly transferred to the metal beneath. According to Dr. L. B. Sebrell, the rubber company's research director, aluminum and steel sheets, with wood bonded to them, have been curled into cylinders of very small diameter without causing the wood to split.

* * *

**Paint Paces Production**—In a comprehensive review of the role played by paint finishes in war output, BUSINESS WEEK points out that military equipment has never been held up by lack of paint, although everything from an eyelet on a G. I. shoe to a battleship requires a protective film.

As an example of new high-speed "fighting formulas," the magazine mentions application of three coats of paint on a big C-2 cargo ship in seven hours. "When peace comes," it continues, "the paint industry is expected to have its production capacity taxed to furnish coating materials for the new houses, automobiles, furniture and other consumer goods which the people are eagerly waiting to buy in great volume."

* * *

**Toward Re-employment**—"It is extremely important that the time of reconversion of the automobile industry to peacetime production be held to a minimum," is the warning delivered recently by Alfred P. Sloan Jr., chairman of General Motors. In his opinion, delays in transferring plants to civilian production will result in unnecessary unemployment.

The huge motor company is ready to spend $500,000,000 in readying its factories for production of its peacetime products. This staggering sum would include reconversion, modernization and retooling. "In part, this is a measure of our faith and confidence in the future," added Mr. Sloan.

*(Continued on page 104)*

# *Just in Case* You May Forget

Walker Laboratories, because of continuous research and development can help you in determining the best finishes for both war work and civilian production.

## We Have What You Want —
## *Or Can Make It!*

WE ARE in position to supply the needs of industry, whether the finish application be on metal, wood, plastics or any other material that may be in use. Back of this is the experience of Walker Laboratories in assisting customers with their finish problems.

The complete line of Walker finishes includes primers, surfacers, lacquers, wrinkles, synthetics and special coatings for special purposes. Whatever your production finishing problem is

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MODERN PRODUCTION FINISHES

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Cleaning Compounds

—for perfect Finishing Results

—they produce a chemically clean surface which insures adhesion and durability of the finish.

PERMAG COMPOUNDS do not injure soft metal and clean quickly, economically, efficiently. Increases the output by cutting down rejects.

PERMAG COMPOUNDS are serving effectively in war material production plants.

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Nationally Represented
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SAVINGS up to 25% of your Finishing Cost!
with a G. M. No. 5 PRESSURE SPRAY GUN

Patented Nozzle Reduces 25% Mist and Saves Paint

Better atomization, greater speed, G. M. Gun lays material more uniformly on object. Excess mist eliminated; paint saved. Patented nozzle with combination of external and internal atomization gives double breakage; finer atomization. From ⅛-in. to full wet 14-in. fan spray. Very moderate price. For details write Dept. L.

G. M. MANUFACTURING CO.
Engineers, Mfrs. of Complete Spray Equipment
216 N. Clinton St. Chicago, Ill.

**Let's Start Now** — Another top G. M. executive has publicized some noteworthy comments on reconversion. Testifying before a Congressional committee on Postwar Policy, Charles E. Wilson, president of the motor firm, asked that 1/10 of 1% of critical materials be allocated now for experimental purposes.

Mr. Wilson told the legislators that this trickle of raw material would be vital in paving the way to smooth peacetime production. "Making the first ten products is hardest," he said tersely.

* * *

**Tougher Aluminum**—A new aluminum alloy strong enough to replace steel in armor plate has been developed by Thomas L. Fritzlen of Indianapolis, a metallurgist associated with the Reynolds Metals Co. Despite its hardness, says R. S. Reynolds, the metal is so light it will eliminate tons of weight from our big airplanes.

This arresting development is said to be more efficient than steel armor plate in deflecting bullets. Although application is now restricted to war uses, many peacetime possibilities are already envisioned—in automobiles—railroad cars, refrigerators and stoves.

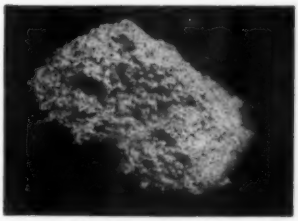
* * *

**Back to Brass**—A sharp reduction in the production of small arms ammunition has permitted the Army to resume the use of brass in artillery cartridge cases. This move is expected to increase production by about one-third, and will also yield a saving of approximately $100,000,000. In addition to requiring fewer manufacturing operations than steel, brass also yields lower scrap losses.

In making the announcement, Maj. Gen. Levin H. Campbell, chief of Army ordnance, paid tribute

## Examine the Many Industrial Uses of

# FLOCK



Flock (finely cut particles of cotton or rayon) is being used industrially to coat or build up a wide variety of surfaces —either to change the appearance to simulate leather, fabric, velvet, upholstery, etc., or for such functional purposes as sound-deadening, insulating, shock-absorbing, built-in gaskets, etc.

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The greatest test of American men and material is now at hand. All of us who contributed our part to make the invasion possible patiently wait for D day with the certain knowledge that American men and arms shall prevail.

*Listed here are a few of the war products now being coated with our materials. Phone, wire or write and let one of our finishing experts help you "keep production rolling."*

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INDUSTRIAL CHEMICAL DEVELOPMENT CORP.
347 MADISON AVE. NEW YORK 17, N. Y.

to the technicians and production men of America, who overcame severe manufacturing difficulties when raw material shortages compelled the substitution of steel cartridge cases.

* * *

**Bright Prospects**—In the view of the National Electrical Wholesalers Association, postwar sales of household and commercial electrical appliances should enjoy an annual sales volume of one to five billion dollars—at the distributors' price level. Many new manufacturers are expected to enter this field when peace comes — shipbuilders, food processors, and perhaps some of the airplane companies.

A postwar planning committee, headed by Herbert A. Metz of the Graybar Electric Co., has recommended a program of action which might well serve as a model for other industries. Among the measures suggested are: Improvement of freight rates and classifications; group warehousing; shorter warrantees and uniform repair policies; and a thorough study of rural markets with the view of expanding in that field.

* * *

**Electronic Heat for Drying**—Nine hours were formerly required to "set" a molded compregwood airplane propeller. Two-thirds of that time is now being eliminated by the use of electronic heating. In explaining this dramatic improvement, the Radio Corp. of America tells us it is based on the uniformity of heating which occurs when high-frequency electricity — generated by electron tubes — is passed through the compregwood.

The heat is produced exactly where it is needed. Compregwood is fabricated from maple sheets, impregnated and bonded together under heat and pressure. The me-

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PROTECTION
AGAINST HARMFUL
PAINT
SPRAY
VAPORS
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RESPIRATOR

Provides easy-to-wear comfort and safety against vapors of paints, lacquers and enamels encountered in spraying; such as turpentine, petroleum distillates, acetates, coal tar derivatives, alcohols, etc. Cartridges quickly replaceable. Bulletin EM-3.

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We have an opening in one of our Massachusetts plants for a chemist or a chemical engineer to work with our production men on industrial paint problems arising in the manufacture of some of our lighting products.

We prefer a man who has had several years' experience on industrial paint and lacquer problems.

It is a position which offers for the right man a good opportunity to grow with our organization. Won't you give us enough information about your training and experience to warrant an early interview?

★

**SYLVANIA ELECTRIC PRODUCTS INC.**

Industrial Relations Department

254 ESSEX STREET
SALEM, MASSACHUSETTS

dium utilized is a plastic which softens at first, and then sets under heat.

* * *

**Fog to Order**—As a means of improving the finish on some types of small arms, a testing laboratory in Milford, Conn., is now able to simulate cold Aleutian mists. Operated by the Fish and Wildlife Service, this research center has found that certain paints used on ordnance material were inadequate for combat conditions in that theater of war. Studies of this character will help, incidentally, in improving finishing materials for peacetime use.

* * *

**Dry Staining**—The Official Gazette of the United States Patent Office recently carried a report on three unusual patents relating to wood finishing which have been assigned to the American Foundry Equipment Co. of Mishawaka, Ind. The technique includes methods of emphasizing the grain structure of wood by bombarding its surface with hard, granular particles coated with dry pigment powder, until the wood grain lines are revealed by the pigment deposit.

The intention is to bring out the grain of the wood by virtual wood etching. Where the wood is soft with relation to other surface areas, the abrasive blasting wears the soft part away and deposits the pigment. Where the wood is hard, it is only slightly affected.

* * *

**Color Is Not Enough**—Matt Denning of Du Pont made an important observation on accident prevention during the course of an address before the Greater New York Safety Council. Since 4% of all male workers are color blind, he said, certain familiar geometrical symbols should always accompany and identify all safety colors.

On the subject of uniform color designations, Denning suggested nation-wide adoption of the following standards: YELLOW to warn against stumbling and falling; ORANGE to designate dangerous parts of machines; RED to indicate fire-fighting apparatus; GREEN to point out first-aid articles; BLUE to guard against touching machinery under repair; and WHITE to mark aisles on dark floors.

* * *

**Furniture From Mexico**—Several of New York's leading department stores are featuring furniture made in Mexico. It is made of primavera, an attractive hardwood in a blond finish.

Some clever innovations are introduced in these pieces. Two liv-

**NALCO**

**Infra-Red Ray Lamps**

Best for Infra-Red Ray Baking and Drying

Carbon Filament Lamps, service proven, available in Inside-Silvered (self-reflecting) or in Clear Glass types. Write for details.

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HAMMOND CHEMICAL SERVICE
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# Are You Properly Emphasizing the *Savings Feature* of Your Plant's Payroll Savings Plan?

**Now's** the time to emphasize over and over again the *savings* feature of your Payroll Savings Plan. To press home to your people the need of building up savings—building them up not only in wartime but also in the years after the war. To point out that a bond cashed before its full maturity is a bond killed before giving full service to its owner—*or his country!*

Buying War Bonds, holding War Bonds, and keeping wartime savings mounting—all are vital. But no one of these is enough by itself. The *savings habit* must be carried over into the years which follow the war. For if, at war's end, we have 'flash-in-the-pan' spending, *everybody loses.* The spender loses, you lose, and the country loses! While a working public, convinced of the value of continued, planned savings is the soundest possible foundation for private enterprise of every sort.

WAR BONDS TO HAVE AND TO HOLD!

★ LET'S ALL BACK
★ THE ATTACK . . .
★ WITH WAR BONDS!

*The Treasury Department acknowledges with appreciation the publication of this message by*

**INDUSTRIAL FINISHING**

*This is an official U. S. Treasury advertisement—prepared under auspices of Treasury Department and War Advertising Council*

ing-room drawer sections, for example, make the ends of a striking flat-top desk. A square-topped table can be transformed in a jiffy to coffee height. Our American designers could profit by a careful study of these imports.

* * *

**For N. Y. Visitors**—Letters from readers expressing their appreciation of our radio ticket service are gratifying to this department. New sponsors now cooperating in the distribution of free tickets to leading broadcasts include: Helbros Watches, Edelbrew Brewery, and Borden's Farm Products. When planning to visit New York, drop a line to: LAWRENCE H. SINGER, 130 W. 86TH ST., N. Y. 24, N. Y.

Broadway's outstanding new plays include: "The Searching Wind," the year's finest drama; "Jacobowsky And the Colonel," the Theater Guild's latest smash hit; "Follow The Girls," a merry musical show; and "Chicken Every Sunday," a gay and amusing comedy.

## Infra-Red Heat Units

An illustrated bulletin on Miskella Hy-Heat Units is being distributed by Infra-Red Engineers & Designers, 1633 E. Fortieth St., Cleveland, Ohio. Some new and interesting features are included in these Hy-Heat Units.

## Offers Postwar Planning Helps

The technical staff of Foster D. Snell, Inc. (Consulting Chemists, Engineers) 305 Washington St., Brooklyn 1, N. Y., offers to help you with your postwar plans, wherever it can. A simple and brief explanation of some of its functions is revealed in an 8-page pamphlet entitled, "Who, What, Why," which the organization will be glad to send you free.

More than 10 years ago this company published a 16-page brochure entitled, "The Consulting Chemist and Your Business," describing the same subject at greater length. A limited number of these brochures are still available. A request will bring a copy of either or both free of charge.


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**Rate: 45 cents per line per insertion—minimum $1.35**

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Industrial Sales Representative desires position representing first-class manufacturer in Detroit. Twenty years' experience on production finishes. Good business and personal record. Now employed. Above draft age. Address IF-990, care Industrial Finishing.

**POSITION WANTED**

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Gardner's "Physical and Chemical Examination of Paints, Varnishes, Lacquers and Colors." State condition, price. C. F. WEINREICH, Cherry-Burrell Corp., 427 W. Randolph St., Chicago 6.

**WANTED TO BUY.**

Small Wood Finishing Plant Equipped to Manufacture Lacquers, Fillers, Stains. Direct your replies with full details to IF-992, care Industrial Finishing.

**FOR SALE.**

One Kiln Type (4x3x7) Electric Oven complete with Bristol Temperature Controller and Recording Thermometer. This equipment has only had Laboratory use and is in excellent condition. Address IF-993, care Industrial Finishing.

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INFRA-RED OVENS & APPLIANCES
INSULATED - REFLECTIVE - SECTIONAL
BY
INFRA-RED ENGINEERS & DESIGNERS
1633 E. 40th STREET - CLEVELAND, OHIO

*We sell lamps, too!*

# Index to Advertisers


Advance Paint Co. ..... Third Cover
Aluminum Industries, Inc. ..... 33
American Chemical Paint Co. ..... 27
Arco Co., The ..... 23

Behlen & Bro., Inc., H. ..... 85
Berry Brothers ..... 65
Binks Mfg. Co. ..... 42-43

Cellusuede Products, Inc. ..... 10
Claremont Waste Mfg. Co. ..... 4
Classified Advertising ..... 110
Clinton Company, The ..... 58
Commercial Solvents Corp. ..... 99
Crescent Bronze Powder Co. ..... 12

Day & Co., James B. ..... 89
Detrex Corporation ..... 53
DeVilbiss Co., the ..... 16-17
Dolan & Co., V. J. ..... 4
DuPont deNemours & Co., E. I. ..... 56-57
Duralac Chemical Corp. ..... 75

Egyptian Lacquer Mfg. Co. ..... 35
Enthone Company, The ..... 1

Ferbert-Schorndorfer Co. ..... 37
Ferro Enamel Corporation ..... 61
Finishine Laboratories, Inc. ..... 87

Glidden Co., The ..... 11
G. M. Manufacturing Co. ..... 104
Grand Rapids Varnish Corp. ..... 71

Hammond Chemical Service ..... 108
Hilo Varnish Corp. ..... 83
Horn Company, A. C. ..... 91

Industrial Chemical Development Corp. ..... 106
Industrial Tape Corp. ..... 14-15
Infra-Red Engineers & Designers ..... 110

Johnson & Sons, Inc., S. C. ..... 63

Kirk & Blum Mfg. Co. ..... Back Cover
Koch Sons, Inc., George ..... 39

Lacquer & Chemical Corp. ..... 25
Lawrence-McFadden Co. ..... 106
Lilly Varnish Co. ..... Front Cover

Maas & Waldstein Co. ..... 93
Magnuson Products Corp. ..... 104
Mahon Co., The R. C. ..... 47
Meyercord Co., The ..... 80-81
Mine Safety Appliances Corp. ..... 107
Murphy Varnish Co. ..... 41

Neilson Chemical Co. ..... 31
New York Woodfinishers Supply Co. 2
New Wrinkle, Inc. ..... 45
North Amer. Elec. Lamp Co. ..... 108

Oakite Products, Inc. ..... 29
O'Brien Varnish Co. ..... 79

Paasche Airbrush Co. ..... 13
Perfection Paint & Color Co. ..... 8
Pittsburgh Plate Glass Co. ..... 67

Qualatone Products, Inc. ..... 73

Randolph Finishing Products Co. ..... 97
Rayon Processing Co. of R. I. ..... 105
Reliance Varnish Co. ..... 55
Rockford Varnish Co. ..... 69
Roxalin Flexible Finishes, Inc. ..... Second Cover
Rudd Lacquer Corp. ..... 105

Sherwin-Williams Co. ..... 48-49
Solvents Recovery Service ..... 108
Standard Varnish Works ..... 101
Stanley Chemical Co. ..... 95
Sterling Tool Products Co. ..... 112
Stille-Young Corp., The ..... 9

United Lacquer Mfg. Corp. ..... 7

Varnish Products Co. ..... 6

Watson-Standard Co. ..... 77
Walker Co., H. V. ..... 103

Zapon Division—Atlas Powder Co. ..... 51



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| | |
|---|---|
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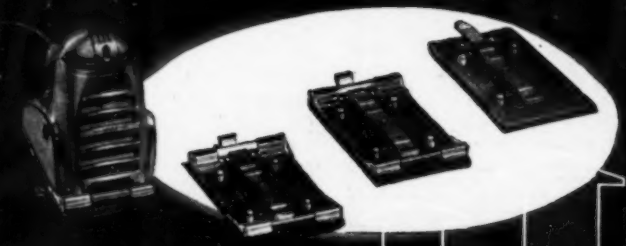

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Load up different grades of abrasives in advance on detachable sanding pads . . interchange them as needed!

Detachable sanding pad feature is only one of the many Sterling Sander advantages! Orbital motion of the pad forces abrasive grits against the work at a speed of 5000 oscillations per minute . . . an action that assures faster, more precise sanding.

This electric portable sander is vibrationless, light in weight and easy to operate. Pad design eliminates any possibility of gouging or marring. On wood, metals or plastics —a smoother job is certain!

Write for new Sterling booklet, "Orbital Motion"—just off the press!

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### 1000 ELECTRIC PORTABLE

## SANDER

*Sterling sanding produces a more uniform surface than hand or ordinary machine sanding!

*For air-driven sanding ask about the Sterling Speed-Bloc Sander!*

**STERLING TOOL PRODUCTS CO.**

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# Saluting our Allies of UNITED NATIONS

★ One of a series to be published in the interest of the War effort. Back up our Allies! Back up our own heroes! Buy more bonds!

# Denmark

DENMARK was invaded by Germany April 9, 1940, although a ten-year pact pledging Germany not to make war or use force against Denmark had been signed May 31, 1939. The Nazis broke their pledge in less than one year. Although occupied and under Nazi domination the Danes held their Parliamentary elections on March 23, 1943—the first since Nazi occupation. Nazi leaders called on the electorate to abstain from voting while Danish authorities called on the people to "appear and vote." The result was that 15% more voters appeared than in the previous election. This spirit of Danish independence dates back to the 9th and 10th centuries, in the days of the Vikings. Today, in 1944, that spirit again is manifest, for the Nazis have been forced to pour more troops into Denmark to quell increasing sabotage and resentment. Movies have been closed because the audiences cheered wildly when caricatures of Hitler appeared on the screens, accompanied by anti-Nazi speeches. The spirit of freedom is hard to kill.

★★★★★★★

We here at Advance are 100% behind the call for unconditional surrender of our enemies—and we're doing all in our power to help bring it about. We're fighting, we're making war finishes—and buying bonds.

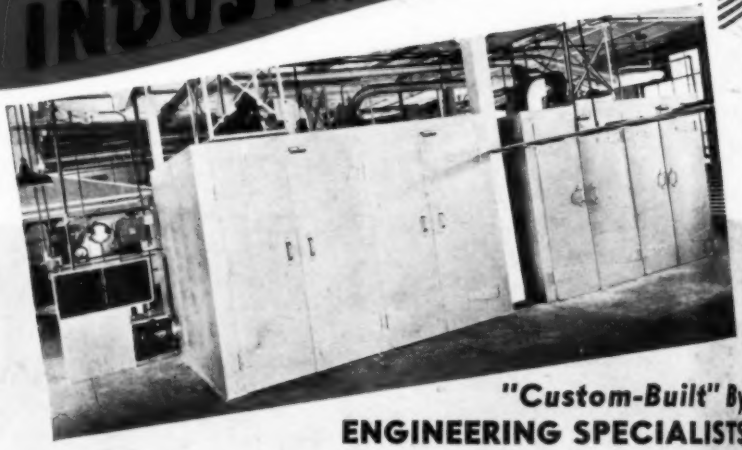
★

ADVANCE PAINT COMPANY

*Manufacturers of Wood & Metal Finishing Materials*

INDIANAPOLIS, INDIANA

# INDUSTRIAL OVENS



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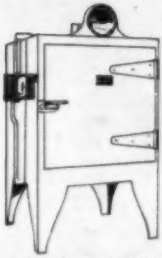

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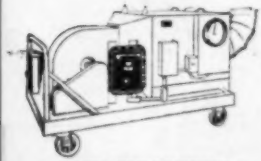

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automatically controlled designed especially for use in the Rayon and Chemical Industries.

Kirk & Blum Industrial Ovens are designed and installed to meet *individual requirements* in product finishing.

The long background of experience, expert knowledge, and scientific approach of the Kirk & Blum Engineering staff is your positive assurance of high oven efficiency and economical operation.

Kirk & Blum specializes in oven installations of *all types* — continuous conveyor drying and baking ovens, core baking ovens, laboratory ovens, etc. These systems are guaranteed to speed production, cut fuel and labor costs, conserve floor space, and promote *maximum safety*.

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